

PUBLIC HEALTH REPORTS

In this issue

Public Health Statistics, 1972-59

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service



Field epidemiology of poliomyelitis

see overleaf

PUBLIC HEALTH REPORTS

Published since 1878

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frontispiece . . .

The assault on poliomyelitis has many scientific facets. The disease is being investigated in the medical and public health laboratories, in the hospitals and medical centers, in the homes and communities where it appears. The inside cover picture symbolically represents some of the field approaches to the study of possible environmental factors in the transmission of poliomyelitis. In the Paulding County, Ohio, farmyard of a family of 5—with poliomyelitis diagnosed in 2 of the 3 children in 1950—are shown: an interviewer (far left) recording the family's medical history as given by the father; a physician and nurse drawing blood samples from the 3 children on the porch; a public health engineer (foreground) taking a water sample while another (rear, left) inspects an abandoned privy; an entomologist (center, stooping) counting flies on grill; behind him another entomologist hanging a light trap on windmill tower to attract other insects; and at right rear 2 veterinarians taking a blood sample from the family cow.

A review of morbidity trends in poliomyelitis in the United States, with special reference to the 1932-52 period, appears on pages 453-466.

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Poliomyelitis Distribution in the United States

By ROBERT E. SERFLING, Ph.D., and IDA L. SHERMAN, M.S.

IN THE EARLY summer of 1894 inhabitants of the Otter Creek Valley in western Vermont became aware of a strange paralytic disease in their community. It seemed to select younger children as particular victims although a few adults were also affected. This first notable epidemic of poliomyelitis in the United States was carefully investigated by Dr. C. S. Caverly, president, Vermont State Board of Health. His field studies, constituting a classic model of "shoe-leather" epidemiology, mark the beginning of our modern knowledge of poliomyelitis. In the following years other investigations conducted in the Caverly pattern demonstrated the extensive distribution of the disease and indicated the need for systematic morbidity reporting.

Massachusetts, in 1907, was the first State (1) to require notification of all cases of poliomyelitis. In 1910, the Surgeon General of the Public Health Service requested all States to submit reports on poliomyelitis for 1909 and 1910. This initiated national reporting of poliomyelitis, although regular inclusion of reports from all States was not achieved until about 1922. Since that time a large body of data has accumulated, forming an increasingly comprehensive base for continuing analyses of elementary epidemiological characteristics, such as secular trends, geographic distribution, and seasonal variation. A number of excellent analyses have been published (2, 3, 4, 5), but

the most recent include only the years through 1946 in the United States (6, 7). Sabin (8) reviewed epidemiological characteristics of a number of poliomyelitis outbreaks throughout the world.

Certain epidemiological characteristics of poliomyelitis have changed with time. In the United States, annual rates both of reported cases and of deaths have shown an upward trend, particularly during the past decade. In earlier decades a lower incidence was observed in southern States than in northern States. This difference is less apparent in recent years.

Continuing studies and analysis of these elementary epidemiological characteristics and their changes are indicated for any infectious disease that remains as a serious problem in the country. Furthermore, discovery of the value of gamma globulin in the prophylaxis of poliomyelitis (9, 10) poses difficult problems as to the best way to utilize available supplies.

The fullest possible knowledge of the current epidemiological pattern of poliomyelitis as revealed by morbidity and mortality reports may be useful in guiding administrative decisions. For these reasons the present paper has been prepared. The past history of poliomyelitis as recorded in published literature and official reports was reviewed and special attention was given the period 1932 to 1952 with particular emphasis on changing patterns of the past 5 to 10 years.

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National Incidence

The trend of the national case and death rates in the United States during the period 1910-52, is shown in figure 1. Since both cases and

deaths were not reported from the same group of States during earlier years, the rates in figure 1 were based on reports from those States which reported both cases and deaths. The record of national incidence of poliomyelitis in the United States falls naturally into four periods:

1. Prior to 1909, when information on incidence, except for a few States, depended on descriptive accounts in the epidemiological literature.

2. From 1909-16, when published reports were available from some States. These were supplemented by special studies of Lavinder, Freeman, and Frost, and their summaries give more complete information on the period.

3. From 1917 through the epidemic year 1931, during which time reporting gradually became more complete. By the middle 1920's most States were reporting annually.

4. From 1932 until the present, during which time national reporting of both cases and deaths has been essentially complete. Because of the obvious differences which characterize national reporting in the different periods, they are presented separately in this discussion.

Early Years

During the 1894 outbreak in Vermont, Caverly collected information on 132 cases. Of these, 119 had shown paralysis, 7 had died before paralysis was noted, and 6, although exhibiting symptoms characteristic of early stages of the illness, had not developed paralysis. In Rutland, the largest community in the affected area, 55 of the 12,000 inhabitants had been stricken—an attack rate of 460 cases per 100,000 population. In nearby Proctor, a town of 2,000 persons, 27 cases had occurred. The remaining 50 cases were scattered through a dozen small communities in the area.

Two years later, in a final report of his investigations (11), Caverly concluded that the disease was "epidemic poliomyelitis," possibly a variant form of the "infantile paralysis" which in the United States had been known principally as an endemic disease of relatively infrequent occurrence.

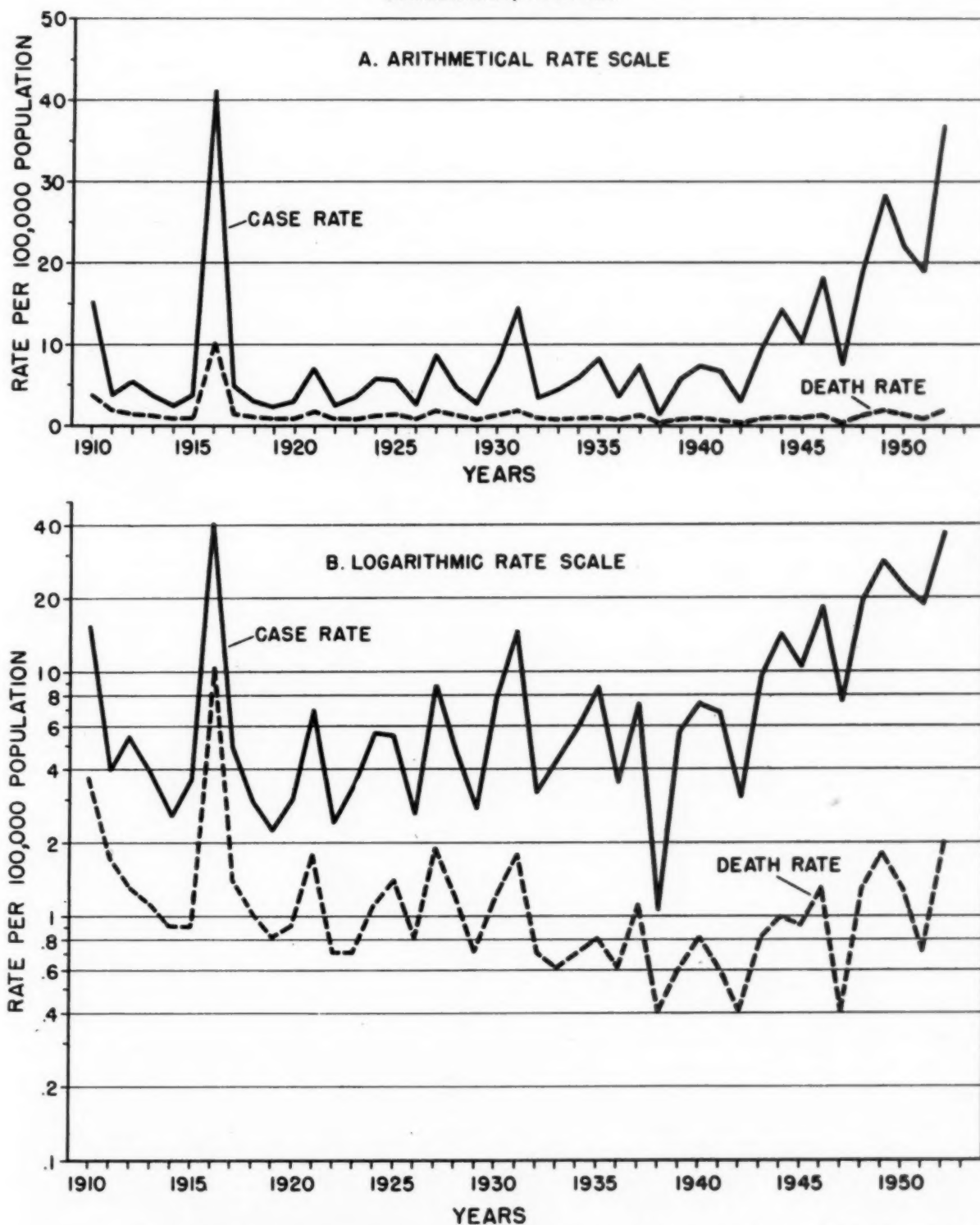
In the succeeding years similar outbreaks occurred with increasing frequency in many parts of the country. In 1908 two papers (12, 13)

summarized accounts of 17 poliomyelitis epidemics in the United States and others throughout the world. By this time, outbreaks had been described in Alabama, California, Florida, Illinois, Maine, Massachusetts, Michigan, Missouri, New York, Pennsylvania, and Wisconsin. These seem generally to have been of smaller scale than the Rutland episode.

In New York City, however, the 1907 outbreak was the largest then recorded in any place. The impact led to an extensive retrospective investigation initiated in October of 1907. The study (14) was conducted by mail and produced detailed information on 752 cases. It was estimated that in all, about 2,500 cases had occurred. Although cases were somewhat concentrated on the east side of Manhattan, the epidemic had extended northward to Poughkeepsie and throughout the western end of Long Island. The case fatality was estimated to be 5-7 percent, about half that of the Rutland outbreak.

In Massachusetts, where smaller outbreaks had been noticed since 1893, incidence was also high in 1907 and the State made poliomyelitis a reportable disease. In 1908, 136 cases were reported in Massachusetts (1). In midwestern Minnesota, 150 cases were recorded, and in Wisconsin, 408. In the following year, 1909, a great outbreak struck in Nebraska. Description of this epidemic (15) was also based on a retrospective study. In answers to letters, 58 physicians reported 999 cases in 18 counties. The greatest number of cases, 384, was reported from Polk County, with a population of 10,000. Douglas County (1910 population, 168,546) reported 79 cases, a rate slightly less than 50 per 100,000 population, and comparable to that of the New York City epidemic of 1907. In 1910 Massachusetts reported 845 cases, Pennsylvania 1,112, and in the midwest, Minnesota and Iowa each recorded more than 600 cases. In the far west, nearly 400 cases occurred in the State of Washington. On August 9 of that year (1910) the Surgeon General of the Public Health Service initiated the request that started national reporting of poliomyelitis. In the same year provision was also made for separate classification of poliomyelitis deaths in the national vital statistics summary.

Figure 1. Annual poliomyelitis case and death rates in States reporting both cases and deaths, United States, 1910-52.



SOURCES: Cases, 1910-50—Public Health Service: The Notifiable Diseases (Pub. Health Rep. Supp.). 1951—National Office of Vital Statistics: Reported Incidence of Notifiable Diseases in the United States, 1951, Annual Supplement to Weekly Morbidity Report, vol. 2, No. 53, 1953. 1952—National Office of Vital Statistics: Morbidity and Mortality Weekly Report, vol. 1, Nos. 1-53 inclusive. Deaths, 1910-49, Vital Statistics of the United States. U. S. Bureau of the Census, 1910-44; U. S. Public Health Service 1945-49. 1950-51 data from advance releases, 1952 data from 10 percent mortality sample, Jan.-Nov., National Office of Vital Statistics.

Years 1909-16

For 1909 only 3 States submitted morbidity reports to the Public Health Service and in the following 7 years the numbers ranged from 11 to 29. After the 1916 epidemic, Lavinder, Freeman, and Frost published a summary of morbidity and mortality for the period 1909-16 which incorporated data from a number of States not included in the earlier national summaries. For the years 1909-15, they obtained additional State morbidity reports and also mortality reports for some States in which no morbidity data were available. For the latter, estimates of cases were made from reported poliomyelitis deaths, assuming a case fatality rate of 20 percent. For States in which only certain cities were in the registration area, deaths for the entire State were estimated from those in the registration areas. Since Lavinder, Freeman, and Frost had noted that in States for which registration was complete, the urban death rate was lower than the rural rate and that a case fatality as high as 20 percent occurred only rarely, they believed that error in their estimates had been in the direction of underestimation. Because of the care which went into this study, their figures for annual incidence of poliomyelitis in the Nation for 1909-16 are quoted below:

Year	Cases per 100,000 population
1909-----	6.9
1910-----	13.3
1911-----	9.5
1912-----	8.5
1913-----	6.6
1914-----	5.1
1915-----	5.1
1916-----	28.5

During the 5 years following the 1910 outbreaks, the estimated national rates declined. In these years the largest outbreaks took place in 1912, when New York reported 1,108 cases and California, 531. These were the only instances in which a State reported more than 500 cases, although Massachusetts, New York, Pennsylvania, and Virginia reported from 100 to 500 cases annually, and Illinois and Ohio reported from 100 to 500 cases in 4 of the 5 years.

The great epidemic of 1916, although leading to highest rates in the northeastern States, also

Table 1. States reporting 20 or more poliomyelitis cases per 100,000 population in 1916

Eastern States	Number of cases	Case rate	Central and western States	Number of cases	Case rate
New Jersey----	4,055	138	Minnesota----	909	40
New York-----	13,223	129	Michigan-----	616	20
Connecticut----	951	76	Montana-----	94	20
Massachusetts--	1,926	52	Wisconsin----	475	19
Rhode Island---	222	36			
Delaware-----	79	37			
Pennsylvania---	2,181	26			
Maryland-----	352	26			
Maine-----	149	19			

SOURCE: Lavinder, Freeman, and Frost (1).

struck severely in the north central area and in Montana. States with rates of approximately 20 per 100,000 population or larger are listed in table 1.

For the year 1916, Lavinder, Freeman, and Frost obtained morbidity reports from all but four States, amounting to a total of 29,061 cases. From these they estimated the national rate to have been 28.5 cases per 100,000 population.

Table 2. Annual poliomyelitis case and death rates, United States,¹ 1917-31

Year	Cases per 100,000 population	Number of States reporting cases	Deaths per 100,000 population death-registration States
1917-----	4.8	37	1.4
1918-----	2.9	38	1.2
1919-----	2.2	40	.9
1920-----	2.4	42	.9
1921-----	6.1	47	1.8
1922-----	2.0	48	.8
1923-----	2.9	49	.9
1924-----	4.6	48	1.1
1925-----	5.2	48	1.5
1926-----	2.2	48	.8
1927-----	8.8	48	1.8
1928-----	4.2	49	1.2
1929-----	2.3	49	.7
1930-----	7.5	49	1.2
1931-----	12.8	48	1.8

¹ Includes District of Columbia as a separate reporting unit. States reporting cases not necessarily the same as those reporting deaths.

SOURCES: Cases, Notifiable Diseases, Annual Reports, Public Health Service; Deaths, Death-Registration States, Annual Reports, Vital Statistics of the United States.

The total number of cases in the District of Columbia and the 27 States which reported to the Public Health Service was 27,363. Among these States, the average rate was 41 cases per 100,000 population.

Years 1917-31

After 1916, no additional efforts were made to obtain complete information on reported cases of poliomyelitis. Annual case rates for the Nation, computed on the basis of the populations of those States submitting reports, and death rates for the death-registration States are shown in table 2. The period seems to have been one of generally low incidence of poliomyelitis. National rates varied from 2.0 in 1922 to 8.8 in 1927, except for the epidemic year of 1931, when the rate reached 12.8. Despite the generally low national rates, outbreaks of moderate size were reported by a number of States.

In 1917, the rate in Vermont was three times the 1916 rate. In the early and middle 1920's, the north central and western States of Minnesota, North Dakota, Montana, and Washington reported the highest rates in the country. In 1927 and 1928 a dozen States, ranging from Maine to California, reported from 21 to 49 cases per 100,000 population. The 1931 outbreak was largely concentrated in the New England and Middle Atlantic States, and in Michigan in the midwest. The highest rates occurred in Connecticut (69.6) and in New York (48.2).

Years 1932-52

Annual rates for the United States during the period 1932-52 are shown in table 3. After the 1931 outbreak, the annual national rates did not exceed 10 cases per 100,000 population until 1944. In 1943 the case rate was 9.3, the highest since 1931, and in the succeeding years rose to successively higher levels, until in 1952 both the case rate (36.9) and the estimated death rate (2.0) were higher than in any year since the 1916 epidemic. With the marked upward trend in the morbidity rate, there has been a slight but definite increase in the mortality rate. This has resulted in a progressive decline in the ratio of reported deaths to cases from 14.0 percent in the period 1932-36 to 5.8 percent in the period 1947-51.

Table 3. Poliomyelitis case rates, death rates, and their ratios, United States, 1932-52¹

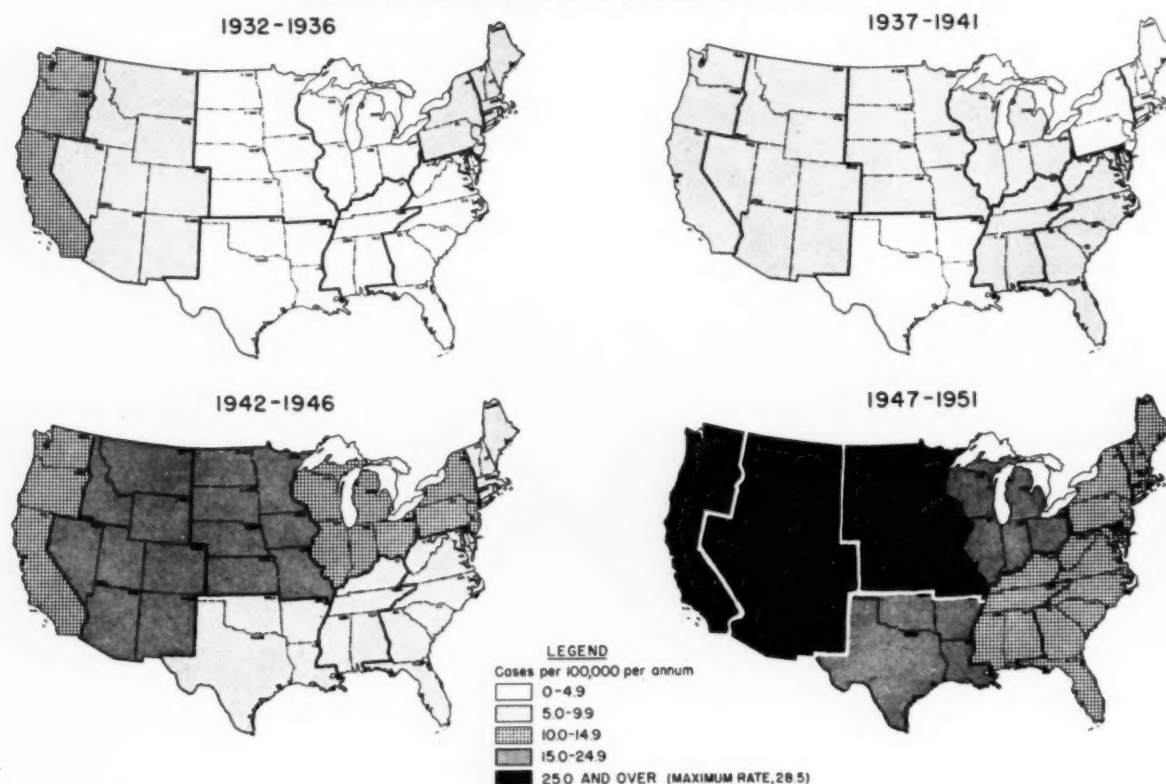
Year	Rates per 100,000 population		Ratio of death rate to case rate (percent)	Average case rate	5-year death rate	Ratio of death rate to case rate (percent)
	Cases	Deaths				
1932---	3.0	0.7	23.3			
1933---	4.0	.6	15.0			
1934---	5.9	.7	11.9			
1935---	8.5	.8	9.4			
1936---	3.5	.6	17.1	5.0	0.7	14.0
1937---	7.4	1.1	14.9			
1938---	1.3	.4	30.8			
1939---	5.6	.6	10.7			
1940---	7.4	.8	10.8			
1941---	6.8	.6	8.8	5.7	.7	12.3
1942---	3.0	.4	13.3			
1943---	9.3	.9	9.7			
1944---	14.3	1.0	7.0			
1945---	10.3	.9	8.7			
1946---	18.4	1.3	7.1	11.1	.9	8.1
1947---	7.5	.4	5.3			
1948---	19.1	1.3	6.8			
1949---	28.4	1.8	6.3			
1950---	22.0	1.3	5.9			
1951---	18.6	.9	4.8	19.1	1.1	5.8
1952---	36.9	2.0	5.4			

¹ Case and death rates based on population of States reporting both cases and deaths.

² 1952 death rate estimated from 10-percent national sample of the National Office of Vital Statistics, January through November 1952.

The morbidity rate for 1952 falls between the two estimates (see above) for 1916, while the estimated mortality rate for 1952 is only one-fifth as great as the 1916 death rate of 10.5 per 100,000. The question of whether or not the 1952 epidemic was more severe than that of 1916 is obscured by several factors relating to the population bases used in determining the rates. In 1952 reports of cases and deaths were available from all States, whereas for 1916 two estimates of the morbidity rate are available, but neither of the populations on which these are based is the same as that of the 26 death-registration States for which the mortality rate was 10.5 per 100,000. Also, the 1916 population of the death-registration States coincided closely with the populations severely affected by the epidemic, while the 1952 estimated death rate of 2.0 per 100,000 includes populations not in epidemic areas. In addition to these factors,

Figure 2. Poliomyelitis morbidity—average 5-year rates, major geographic divisions of the United States, 1932–36, 1937–41, 1942–46, 1947–51.



others must be considered: for example, improvement in completeness and accuracy of morbidity reporting; and improvement in treatment, presumably resulting in lowered case fatality rates.

Geographic Distribution

The geographic distribution of poliomyelitis in the United States during the last 20 years is described for the nine major geographic divisions of the country from two approaches: average incidence in successive 5-year periods and variation in annual incidence. Each method gives emphasis to different aspects of secular changes in geographic distribution of the disease.

Average Incidence

Aycock (3), in studying distribution of poliomyelitis in the United States during the period 1910–27, and later Wells (4), in a study of the period 1915–29, came to the conclusion that incidence in the northern States had been distinctly greater than that in the southern

portion of the country. Both of these studies included the 1916 epidemic, which caused the average rates to be heavily weighted by this single northern epidemic. Collins (5), examining data for the period 1930–45 noted that little poliomyelitis had been reported from the three southern divisions prior to 1935 but that subsequently they experienced “some rather large epidemics.” Gilliam, Hemphill, and Gerende (6, 7), in a study of county rates during the period 1932–46, came to a similar conclusion. In their study, the average annual rate in the period 1932–46 for northern counties was 7.6 and for southern counties, 6.4. However, in large urban counties of over 500,000 population, average rates were lower in northern than in southern counties. In counties under 100,000 population, the reverse was true—the average rates were higher in northern than in southern counties. The period was one of generally low incidence, except for the later years, 1944–46. In the present study, examination of rates for the 20 years 1932–51, in successive 5-year periods, did not seem to reflect consistent geographic localization (fig. 2).

During the first 10 years (1932-41) of the period, average incidence was remarkably uniform over 5 of the 9 major geographic divisions (table 4) ranging from 5.1 to 5.9 per 100,000 population. One of these five was the East South Central division. The lowest rates occurred in the West South Central and South Atlantic States (3.0 and 4.6); the highest rates occurred in the Mountain and Pacific divisions (6.3 and 10.7).

During the first half (1942-46) of the next decade, the northwestern divisions had rates which were generally higher than those of the South Atlantic, East South Central, and West South Central divisions. However, within the eastern and southern regions, the average 5-year rates for the New England States was somewhat lower than that of the West South Central States.

In the next 5 years (1947-51), a different configuration was displayed, the divisions west of the Mississippi having rates considerably higher than those east of the Mississippi. Average 5-year rates were nearly the same, 13.4, 14.0, 14.1, and 14.5 per 100,000 respectively, in the East South Central, South Atlantic, New England, and Middle Atlantic States. In intermediate position were the East North Central and West South Central States with average rates of 20.4 and 22.2 per 100,000 population.

The West North Central, Mountain, and Pacific States, with average 5-year rates, respec-

tively, of 28.5, 28.5, and 26.1, were markedly higher than the rest of the country. For individual States, 5-year average rates are shown in table 5. It should be noted that the 5-year average rates varied considerably among the States in each division.

Over the past 20 years geographic differentials in incidence between regions of the United States have existed. In the long run, these differentials have tended to become equalized, although over rather extended time periods. Over moderate periods of time, one region may experience severe epidemics alternating with periods of very low incidence, while another region may be experiencing a succession of epidemics. As a result, even longtime averages are greatly influenced by a few severe epidemic years.

The average 20-year rates for western geographic divisions, which depart most from average rates of the remainder of the country, have been greatly influenced by the experience of recent years. The marked recent rise in the western States generally, and particularly, in the southwest, suggests that it may be of interest to watch the future trend in the southeastern States which have recently had only moderate increases in their annual rates.

Changing Epidemic Patterns

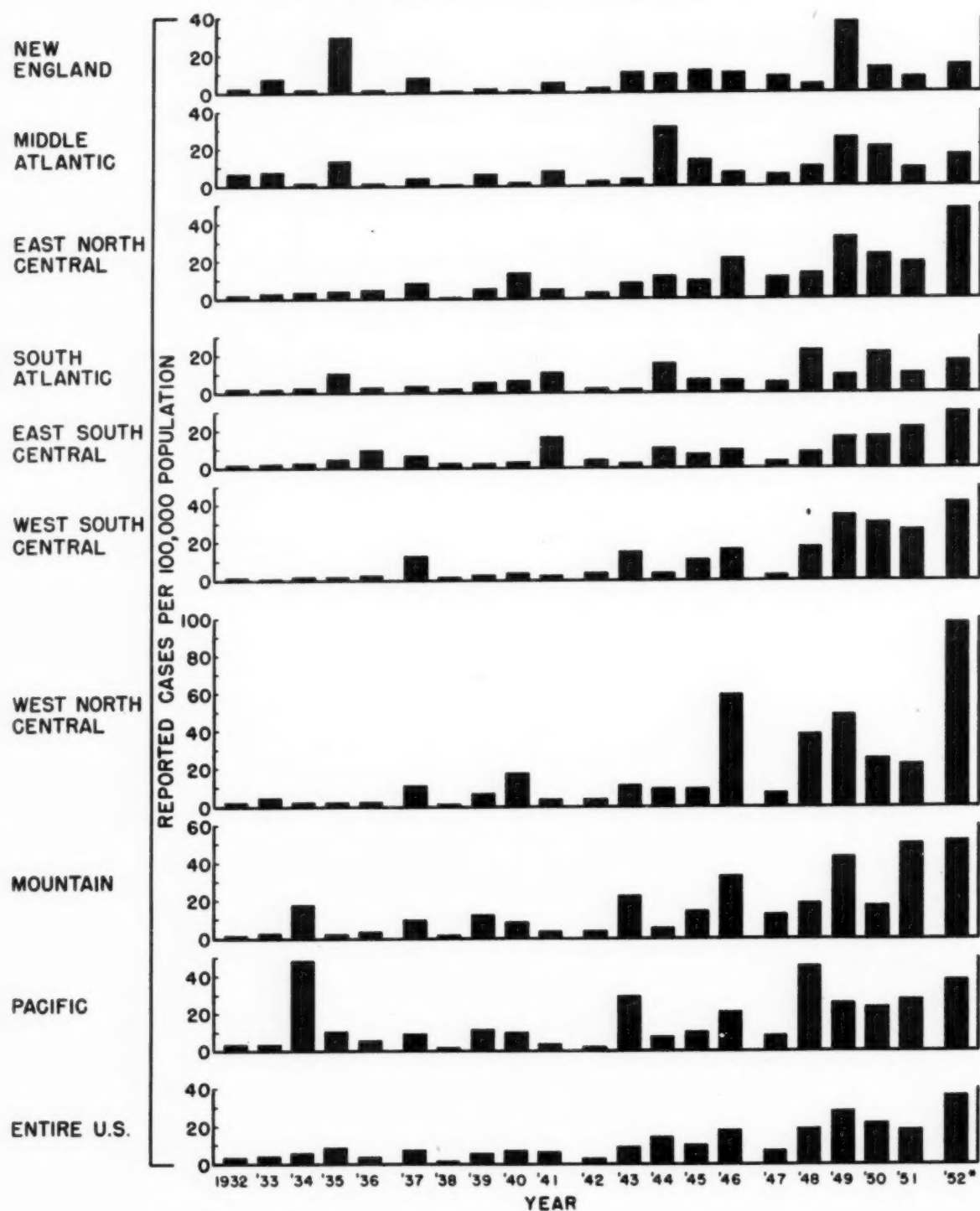
Interpretation of geographic differences calls for consideration not only of average incidence,

Table 4. Average poliomyelitis case rates in each division of the United States, 1932-51, by 5-year, 10-year and 20-year periods¹

Division	5-year mean				10-year mean		20 year mean
	1932 through 1936	1937 through 1941	1942 through 1946	1947 through 1951	1932 through 1941	1942 through 1951	1932 through 1951
New England.....	8.4	3.4	8.7	14.1	5.9	11.4	8.6
Middle Atlantic.....	6.0	4.2	11.6	14.5	5.1	13.1	9.1
East North Central.....	3.5	6.7	11.1	20.4	5.1	15.7	10.4
South Atlantic.....	3.8	5.3	6.4	14.0	4.6	10.2	7.4
East South Central.....	4.2	6.3	6.8	13.4	5.2	10.1	7.7
West South Central.....	1.5	4.6	9.9	22.2	3.0	16.0	9.5
West North Central.....	2.9	8.1	18.9	28.5	5.5	23.7	14.6
Mountain.....	5.5	7.1	16.6	28.5	6.3	22.5	14.4
Pacific.....	14.2	7.2	14.0	26.1	10.7	20.1	15.4

¹ Average numbers of cases per 100,000 population based on annual reports in *Notifiable Diseases*, Public Health Service.

Figure 3. Poliomyelitis morbidity in major geographic divisions of the United States, reported cases per 100,000 population per annum, 1932-52.



*1952 PRELIMINARY NOTIFICATIONS

but also of shifting centers of epidemic concentration. Configurations of States swept by epidemics change from year to year as the areas of greatest incidence move from one region to another. Regions swept by an epidemic at one time dissolve into components which re-form in new configurations as a succeeding epidemic wave develops.

The annual concentrations of epidemics have been illustrated excellently in the series of maps prepared for many years by Dr. Carl C. Dauer. The first maps in this series were published in *Public Health Reports* (16) and included the years 1933-37. For subsequent years the maps have been published yearly in an annual review of reported poliomyelitis in the United States. The changing centers of epidemic concentration illustrated in detail in Dauer's series of maps can also be recognized in the annual poliomyelitis rates (fig. 3 and table 6) for each division of the United States.

From 1932 through 1939, three distinctive patterns of epidemic outbreaks emerge: The Mountain and Pacific States, which experienced their most severe outbreak in 1934; the New England, Middle Atlantic, and South Atlantic States in 1935; the East South Central States in 1936 and 1937; and the remaining three central divisions in 1937.

From 1940 through 1948, severe epidemics did not strike east and west of the Mississippi in the same years, except for States in the East North Central division, which experienced epidemics coincident in some years with States east of the Mississippi; in other years, with western States. In 1944, the East North Central States reflected the eastern epidemic; and in 1946, the western outbreak.

In 1949, all divisions except the South Atlantic experienced severe outbreaks of poliomyelitis. In the latter division, 1948 and 1950 were years of greater severity. In 1950, rates were moderately high in all areas.

In 1951, the national rate was lower than in the preceding 3 years. The highest rate was recorded in the Mountain division. In the severe epidemic of 1952, a record rate of 98.0 occurred in the West North Central States. Record rates were also reported from the other three central divisions and from the Mountain

Table 5. Reported cases of poliomyelitis, per 100,000 population, by States, 1932-51¹

State	5-year averages			
	1932-36	1937-41	1942-46	1947-51
New England:				
Maine.....	8.6	5.0	4.8	14.9
New Hampshire.....	4.2	3.3	12.4	13.9
Vermont.....	9.3	6.4	13.0	15.1
Massachusetts.....	9.0	3.1	7.3	13.5
Rhode Island.....	11.3	2.4	8.2	10.6
Connecticut.....	6.5	3.3	10.7	17.1
Middle Atlantic:				
New York.....	7.7	4.7	14.6	18.5
New Jersey.....	5.9	4.0	9.5	16.5
Pennsylvania.....	4.1	3.6	5.6	8.0
East North Central:				
Ohio.....	3.4	5.5	7.4	18.8
Indiana.....	1.5	6.0	6.6	14.3
Illinois.....	4.0	5.2	15.3	19.4
Michigan.....	4.8	11.1	8.9	25.0
Wisconsin.....	2.4	6.7	14.7	25.6
West North Central:				
Minnesota.....	5.6	11.0	29.5	32.2
Iowa.....	2.2	11.4	11.1	34.4
Missouri.....	1.4	4.3	10.6	14.8
North Dakota.....	4.6	3.1	19.2	25.3
South Dakota.....	3.7	6.5	13.6	51.7
Nebraska.....	1.8	7.5	17.2	37.6
Kansas.....	3.3	9.8	23.7	26.0
South Atlantic:				
Delaware.....	2.2	3.4	12.4	21.9
Maryland.....	2.9	4.2	7.9	12.0
District of Columbia.....	5.5	5.0	10.7	13.9
Virginia.....	7.4	4.3	9.1	15.7
West Virginia.....	3.6	9.1	4.6	13.5
North Carolina.....	5.1	2.9	6.9	20.7
South Carolina.....	2.1	7.4	3.7	10.6
Georgia.....	2.2	7.1	2.9	9.7
Florida.....	.9	4.6	7.9	11.3
East South Central:				
Kentucky.....	4.7	5.5	8.6	14.0
Tennessee.....	5.2	5.5	6.1	14.4
Alabama.....	4.2	8.2	5.1	9.8
Mississippi.....	2.3	6.0	6.0	15.6
West South Central:				
Arkansas.....	1.2	5.3	7.7	21.1
Louisiana.....	2.2	3.5	6.5	12.7
Oklahoma.....	1.5	6.7	11.4	26.0
Texas.....	1.2	3.9	10.8	24.0
Mountain:				
Montana.....	13.3	6.9	10.1	12.9
Idaho.....	8.4	5.4	3.9	44.3
Wyoming.....	3.4	8.7	15.3	33.3
Colorado.....	1.5	7.8	23.9	32.8
New Mexico.....	3.3	6.9	10.8	18.0
Arizona.....	9.2	6.4	12.6	23.5
Utah.....	2.1	8.9	28.1	35.8
Nevada.....	5.1	1.9	9.4	16.5
Pacific:				
Washington.....	12.7	7.6	14.5	19.3
Oregon.....	4.5	5.3	14.2	20.9
California.....	15.9	7.4	15.5	29.5

¹ Preliminary notifications.

Table 6. Cases of reported poliomyelitis in major geographic divisions, 1932-52

Year	Cases per 100,000 population									
	New England	Middle Atlantic	East North Central	West North Central	South Atlantic	East South Central	West South Central	Mountain	Pacific	United States
1932	2.3	6.7	1.9	2.3	2.0	1.8	1.1	1.4	3.5	3.0
1933	7.1	7.5	3.0	4.9	1.8	2.0	.4	2.8	3.5	4.0
1934	1.6	1.5	3.7	2.5	2.2	2.6	1.7	17.9	48.1	5.9
1935	29.3	13.2	4.1	2.2	10.2	4.9	1.8	2.2	10.5	8.5
1936	1.5	1.3	4.9	2.7	2.8	9.7	2.3	3.2	5.6	3.5
1937	8.0	4.1	8.3	11.1	3.1	6.6	12.4	9.8	9.1	7.4
1938	.9	.9	1.0	1.3	1.8	2.3	1.4	1.6	1.6	1.3
1939	1.8	6.2	5.3	7.0	5.1	2.6	2.8	12.1	11.4	5.6
1940	1.2	1.6	13.7	17.5	6.1	3.4	3.8	8.7	9.9	7.4
1941	5.2	8.0	5.0	3.8	10.4	16.5	2.4	3.5	3.9	6.8
1942	2.1	2.4	3.5	4.0	2.0	4.1	3.7	3.8	2.3	3.0
1943	10.5	3.4	8.5	11.5	1.3	2.3	14.9	22.4	29.3	9.3
1944	9.6	31.1	12.2	9.9	15.2	10.8	3.8	5.1	7.5	14.3
1945	11.3	13.9	9.8	9.8	6.9	7.1	10.7	14.0	10.1	10.3
1946	10.1	7.1	21.5	59.5	6.7	9.5	16.2	37.7	21.0	18.4
1947	8.2	6.9	11.8	7.2	5.6	3.7	2.7	12.6	8.3	7.5
1948	4.3	10.1	13.8	38.3	22.7	8.6	17.2	18.9	45.3	19.1
1949	37.1	25.4	32.8	48.9	9.5	16.5	34.3	43.3	25.8	28.4
1950	13.0	20.7	23.8	25.4	21.8	16.7	30.2	17.2	23.4	22.0
1951	7.9	9.5	19.6	22.8	10.4	21.5	26.7	50.4	27.5	18.6
1952	14.2	16.1	47.7	98.0	17.0	30.0	41.3	51.8	38.1	36.9

SOURCE: Notifiable Diseases 1932-50 and Annual Summary in *Public Health Reports*, May 25, 1951, pp. 677-683. National Office of Vital Statistics: Weekly Morbidity Reports, 1952.

States. The Pacific division experienced the third highest rate in its history. Along the eastern seaboard rates were well below the national average, although moderately high in comparison with many previous years.

Seasonal Distribution

If the reported cases of poliomyelitis in the United States for each month are averaged for a few years, the resulting curve rises slightly in

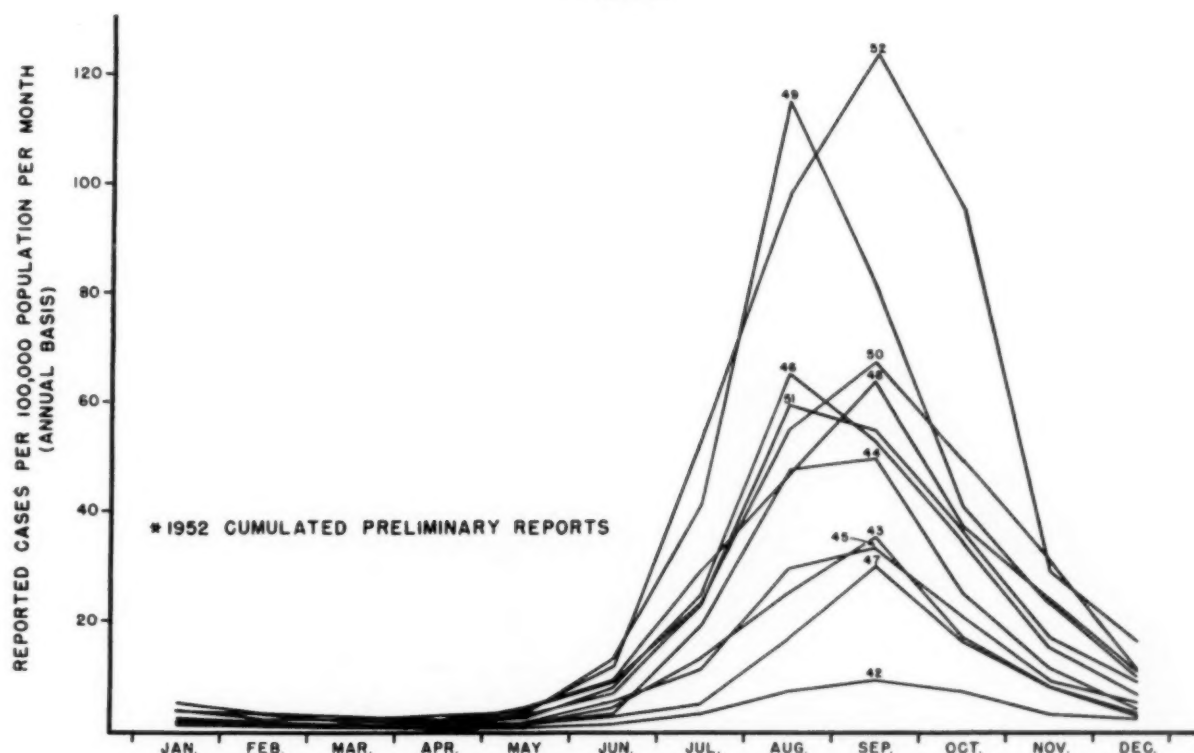
Table 7. Seasonal incidence of poliomyelitis, United States, 1942-52

[Reported cases per 100,000 population, each month, adjusted to annual base]

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual Rate
1942	1.0	0.9	0.7	0.5	0.7	1.1	3.4	6.9	8.7	6.8	3.3	2.2	3.0
1943	1.3	.9	.9	.7	1.2	4.2	13.0	25.5	34.6	17.2	8.0	3.2	9.3
1944	1.0	.9	.7	.8	1.2	3.8	19.6	47.8	49.5	25.5	10.8	4.0	14.3
1945	1.5	1.5	1.1	1.1	1.6	4.7	11.2	29.3	33.9	21.2	9.8	4.6	10.3
1946	1.7	1.3	1.3	1.2	2.4	8.0	25.5	65.2	52.8	34.1	14.9	6.2	18.4
1947	2.4	1.6	1.2	1.0	1.3	2.2	5.6	16.1	30.4	16.3	8.0	3.3	7.5
1948	1.4	1.0	1.0	1.1	4.4	9.2	29.5	46.6	62.9	36.6	24.1	11.5	19.1
1949	3.9	2.2	2.0	1.6	3.3	12.6	41.8	115.0	81.3	41.1	23.7	9.9	28.4
1950	3.7	3.4	2.9	2.1	4.0	9.1	24.0	54.9	66.6	49.7	31.1	11.4	22.0
1951	5.3	3.2	1.8	2.0	3.0	7.0	22.8	59.5	54.9	36.4	16.7	8.5	18.6
1952 ¹	5.0	3.0	2.1	2.8	3.7	11.9	53.0	96.0	121.7	94.0	29.5	16.9	36.9

¹ Preliminary notifications.

Figure 4. Poliomyelitis morbidity, seasonal incidence, United States, rates by month, each year, 1942-52.



May, more rapidly in June and July, and reaches a maximum elevation in August and September. In October there is a marked decline which continues through succeeding months. In some years (fig. 4, table 7), August is the month of maximum incidence; in others, September; but in some, the attack rate has been

approximately the same in both months, for example, the years 1944 and 1951. In two recent years, 1950 and 1952, the October rate has been relatively higher than in earlier years.

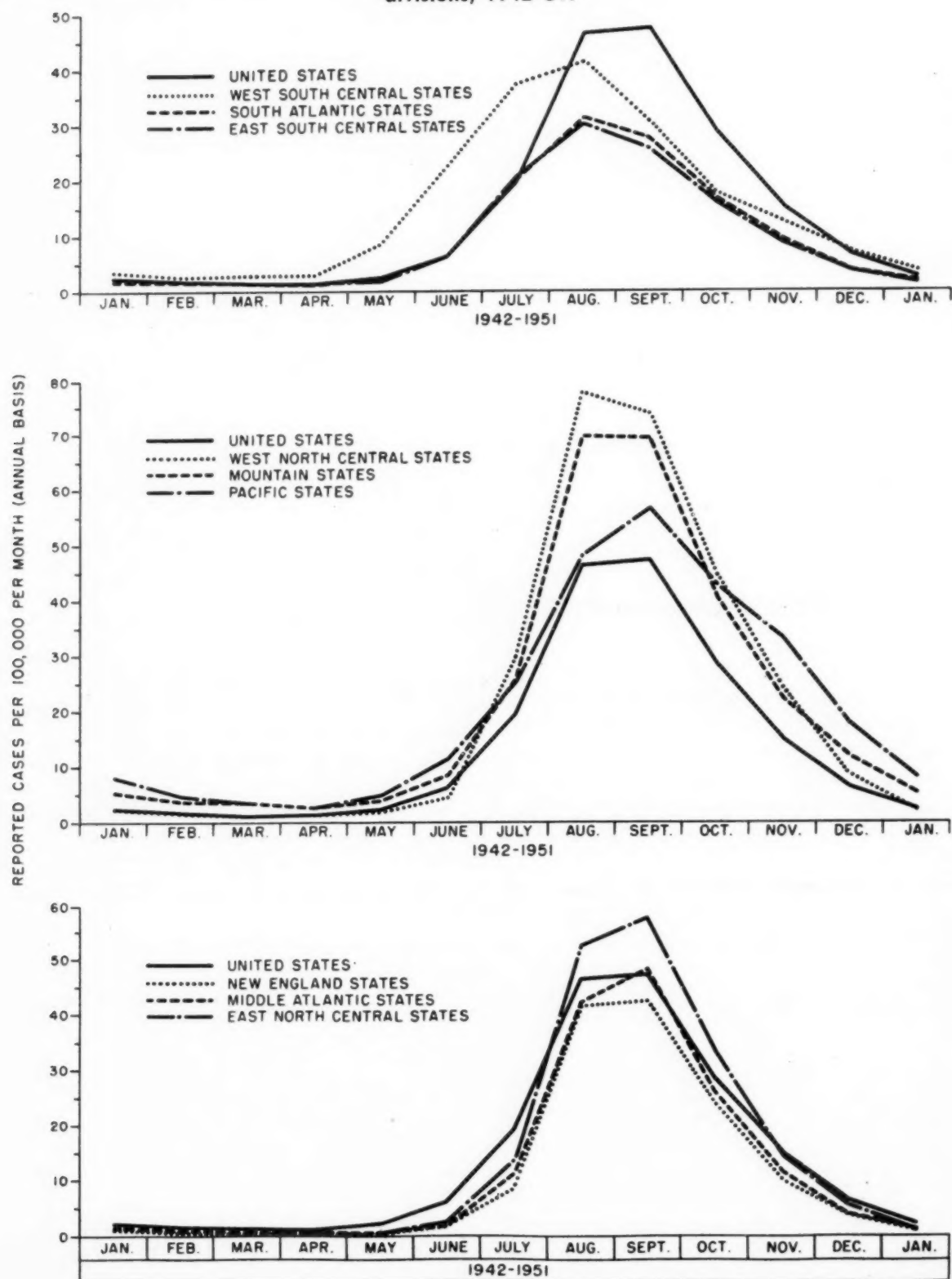
The seasonal change in incidence differs from one region of the United States to another (fig. 5, table 8) and these differences are re-

Table 8. Seasonal incidence of poliomyelitis in major geographic divisions, 10-year average, 1942-51

[Reported cases per month, per 100,000 population adjusted to annual base]

Divisions	January	February	March	April	May	June	July	August	September	October	November	December
New England.....	1.1	0.5	0.5	0.4	0.5	1.7	8.7	41.6	42.7	24.2	10.1	3.8
Middle Atlantic.....	1.4	.9	.7	.7	.7	1.9	11.2	42.2	48.2	26.6	11.6	4.0
East North Central.....	1.1	.8	.6	.5	.7	2.3	13.9	52.8	57.7	33.8	14.6	5.5
South Atlantic.....	1.8	1.8	1.2	1.1	2.4	6.2	20.0	31.1	27.5	16.6	9.2	3.7
East South Central.....	1.5	1.8	1.3	1.3	1.6	6.2	20.7	30.0	25.7	15.8	8.6	3.8
West South Central.....	3.5	2.5	2.9	2.8	8.4	22.6	37.2	41.1	30.4	17.8	12.3	7.0
West North Central.....	2.1	1.5	1.0	1.1	1.6	4.4	29.5	77.9	73.9	44.6	24.1	8.7
Mountain.....	5.1	3.6	3.3	2.4	3.9	8.3	25.6	69.7	69.3	40.5	22.2	12.0
Pacific.....	8.0	4.7	3.4	2.7	4.9	11.2	25.4	48.0	56.5	42.8	33.1	17.9
United States.....	2.3	1.7	1.3	1.2	2.3	6.2	19.6	46.6	47.3	28.4	15.1	6.5

Figure 5. Poliomyelitis morbidity, seasonal incidence, 10-year average rates by major geographic divisions, 1942-51.



flected in the national curve of seasonal incidence as the center of epidemic intensity year-to-year moves from one area to another.

In the southern divisions of the United States, the initial rise occurs in May, reaching a maximum level in August; in the central and Pacific States, the rise begins in June and the high levels occur in August and September; and in the northeastern divisions the rise is not appreciable until July, and the highest average rates are observed in September. Generally, the epidemic span is shorter, with rise and fall more rapid, in northern latitudes.

Seasonal concentration of cases during a short epidemic period has been characteristic of the New England, Middle Atlantic, and East North Central States. In these divisions (table 9), 60 percent of the year's cases, on the average, have been reported during August and September. In the West North Central and Mountain divisions, concentration in these months has been similar but somewhat less pronounced. In these divisions, 50 to 55 percent of the total annual number of cases were reported during August and September in 1942-51.

In the South Atlantic, East South Central, and West South Central divisions, concentration in August and September has been less noticeable. Approximately 60 percent of the year's cases, on the average, were reported during July, August, and September. In the

Pacific States, extension of the season of higher incidence into the fall months has been noticeable; 40 percent of the annual total cases, on the average, having been reported during August and September, and another 30 percent of the annual totals, during October and November.

Summary

Early descriptive accounts of poliomyelitis outbreaks in the United States have been reviewed and an analysis made of State morbidity reports since 1907.

Poliomyelitis, a comparatively rare disease in the early years of this century, has since been recognized as a communicable disease problem in every State in the Nation. During the last 20 years the trend of the annual case rate has been upward, particularly during the last decade, during which a marked increase has occurred. The death rate has shown a slight but definite increase. In 1952, for the Nation, both the case rate and the estimated death rate were the highest since the 1916 epidemic. The ratio of reported deaths to reported cases has decreased over the last 20 years.

Earlier observers noticed that rates had been higher in the northern than in the southern regions of the country. In recent years this difference has diminished and an East-West differential is more prominent. In recent years, both average and maximum rates have been

Table 9. Seasonal incidence of poliomyelitis in major geographic divisions; number of cases per month expressed as percentage of total cases, 10-year average, 1942-51

Divisions	January	February	March	April	May	June	July	August	September	October	November	December	Total
New England.....	0.8	0.3	0.4	0.3	0.4	1.2	6.5	31.0	30.9	18.1	7.3	2.8	100.0
Middle Atlantic.....	.9	.6	.4	.4	.5	1.2	7.6	28.5	31.6	18.0	7.6	2.7	100.0
East North Central.....	.6	.4	.3	.3	.4	1.2	7.6	29.1	30.7	18.6	7.8	3.0	100.0
South Atlantic.....	1.4	1.4	1.0	.9	2.0	5.0	16.5	25.7	21.9	13.7	7.3	3.1	99.9
East South Central.....	1.3	1.4	1.1	1.1	1.4	5.1	17.7	25.7	21.3	13.5	7.1	3.3	100.0
West South Central.....	1.9	1.2	1.5	1.5	4.5	11.8	20.0	22.1	15.8	9.5	6.4	3.8	100.0
West North Central.....	.8	.5	.4	.4	.6	1.6	11.1	29.2	26.8	16.7	8.7	3.2	100.0
Mountain.....	1.9	1.2	1.3	.9	1.5	3.1	9.8	26.6	25.6	15.4	8.2	4.6	100.1
Pacific.....	3.1	1.7	1.3	1.0	1.9	4.3	10.0	18.8	21.5	16.8	12.6	7.0	100.0
United States.....	1.3	.9	.8	.7	1.3	3.4	11.1	26.4	26.0	16.1	8.3	3.7	100.0

higher in the western and north central divisions of the United States than in the northeastern and southeastern divisions. Over extended periods of time geographic concentration has not been consistent.

In southern regions of the country, seasonal rise in incidence occurs earlier and the epidemic span is longer than in the northern regions.

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Type I Poliomyelitis Virus Adapted to Mice

Successful adaptation of type I (Mahoney) poliomyelitis virus to Swiss mice has been achieved by Drs. C. P. Li and Morris Schaeffer of the Public Health Service Communicable Disease Center. Their report appears in the March 1953 issue of the *Proceedings of the Society of Experimental Biology and Medicine*, pages 477-481.

The authors conclude that: "The use of the intraspinal route of inoculation and the selection of a mutant or variant of the virus is believed to be responsible for this adaptation. . . . With this attainment, all three poliomyelitis virus types have now been adapted to mice. This will permit for rapid progress in field and laboratory studies of poliomyelitis." The findings are important to poliomyelitis diagnosis and to the development of a live virus vaccine.

Public Health Operating Statistics

By ROBERT G. WEBSTER, M.P.H.

"GOLD THAT BUYS health can never be ill spent." Thus, in 1603, John Webster, Elizabethan poet and dramatist, gave expression to an opinion which later centuries have proved correct. The dividends of investments in health were never greater than they are today.

But today we must be prepared for a tightening of the purse strings. The cost of war or its prevention, estimated at over 75 percent of the total Federal budget (1), may have seriously threatened the future of the grants-in-aid fiscal program supported by the Congress. The nearness of the saturation point in the potential for tax collections in State and local governments indicates the need for better justification of public health programs, if increased support is to be expected from this source.

The generosity of the American people has made it possible for many voluntary organizations to make significant contributions to public health. Increasing efforts are required to collect such funds, and the number of voluntary groups competing for the beneficence of the public multiplies the problem of financing public health. If appropriating bodies are asked to provide adequate funds, public health agencies must provide standards for evaluation against which the funds requested may be measured. We should, therefore, thoughtfully consider the use of statistics to measure the costs of public health.

Robert G. Webster, M.P.H., is chief of the division of administration of the California State Department of Public Health. This paper was presented at the 2d Conference on Public Health Statistics at the University of Michigan on June 17, 1952.

Financial Evaluation

Historically, the total gross cost of a unit of government was simply the total of the budgetary column. While this figure has some use as a general indication of the division of expenditures among the large areas of government service, more detail is needed to study the specific costs of a public health program. The recognition of a problem and the desire to do something about it are seldom sufficient in themselves to justify the grant of funds from the public treasury.

The use of statistics in building a vivid accounting picture of the operations of an agency well justifies the existence of a statistical service. Such an application of statistics gives real body to the substantiation and need for the statistical unit and presents opportunity for a realistic use of quantitative measurements in a situation where realism might be overlooked.

Service Records

"Service statistics in public health are numerical measurements of services rendered to individuals and to the community through public health programs" (2). Service statistics are a measurement of activity in terms of number of units rather than in terms of dollars.

Service, operating, or performance statistics have real value in the analysis of public health programs. They serve as guides for the administration, for the measurement, and for the evaluation of activities, and for planning. It should not be overlooked, however, that service statistics, to serve their full purpose, should be related as far as practical to specific public health problems—the problems of population, water

supply, sanitation, morbidity, mortality, and other factors.

Screening surveys, one of the newer activities in the public health field, furnish practical records in the fields of tuberculosis, venereal disease, and chronic disease. Operating records of these surveys often indicate the number of suspects found, suspects referred for medical followup, referrals completed, and the active or positive diagnoses resulting from the screening program. Statistics as to the number of persons screened are, of course, basic.

Records of persons immunized for diphtheria, pertussis, tetanus, smallpox, typhus, typhoid, or other diseases are another measure of the progressiveness and the activity of a public health agency. Such statistics usually are maintained by age groups. Often a separate tabulation is made of booster shots given.

The service records in communicable disease may be generally classified as records in the area of case finding and records related to control and service. The number of individuals X-rayed or the number of X-ray films used is an example of the case-finding statistic.

In the tuberculosis field, a tabulation of the number of tuberculosis contacts investigated becomes an evaluation of the case-finding activities. The number of laboratory tests made are of interest, too.

For control of service activities, it is helpful to compile a record of the clinic hours during which the clinic operates. This serves not only as an evaluation of the use of time, but it also indicates the availability of the service. The number of visits made to a clinic is the most frequently compiled operating statistic. More important, and more difficult, is the count of individuals admitted to a clinic which gives an opportunity for the evaluation of clinic coverage, rather than of only the clinic traffic.

Applicable to most public health programs is the tabulation of field visits or home visits. It cannot be overlooked in any cost study since in many activities a large proportion of the time is spent in home calls.

Operating records may be compiled in health education, although they are not always significant. The number of public health films shown and the number of people viewing them are tabulations which may be obtained with a min-

imum of effort. Knowing the number of different training courses offered and the number of people exposed to such courses leads to an evaluation of a direct training enterprise. The number of pieces of printed material which are distributed is in itself not too meaningful, but a record of how many people read such literature, and of whether they are stimulated to seek health services, could be.

The obvious service statistics in the laboratory field are the number of various tests which are made. Upon refinement, such records will indicate test results in statistical form. An index to the efficiency of collection procedures and techniques is the number of specimens examined and whether they were received in a satisfactory condition.

A wealth of operating records has been accumulated in the area of sanitation. Here the basic index is the number of field visits made, usually tabulated by type of visit. Often the number of abatements accomplished is of value. Some environmental sanitation units maintain extensive statistical compilations. These are often justified because of the wide coverage of the assignments and responsibilities in sanitation.

The evaluation schedule (3) of the American Public Health Association is a notable contribution to service statistics. Although the schedule is geared primarily to measure problems and to provide an evaluation of services available in a health department, it has led many public health agencies to become conscious of the need for, and value of, regular statistical records of activities. An outgrowth of the evaluation schedule are health practice indexes which have caused many local communities to realize their inadequacies or perhaps their proficiency. There are doubtless other operating records meeting a specific need in public health. It should be pointed out that while tabulations of cases and deaths are basic to public health, they are essentially records of occurrence rather than records of activity.

Problems of Compilation

"What is a home visit?" is a seemingly simple question, but to define it so as to assure standardization is difficult.

How does one record a partly completed procedure? Or what happens when the usual effort and time were expended in an activity, but there were no results? What happens when there were multiple accomplishments on one call? The accurate defining of geographic limits in the compilation of field service must be clear and concise: They must be understood if the statistics of operations are to reflect activities accurately.

Standardization

Ideally, the recording form should be one on which data may be quickly and easily recorded by a check mark without written explanation. Coupled with this ideal factor, however, is the seemingly contradictory need for adequate spacing and for clarity.

Attempts have been made to create standard forms of operating records. While experience is valuable in the preparation of forms, and while some day, perhaps, standard forms will be developed for definite purposes, it is probably naive to expect that the compilation of operating records can be standardized because of the variations in problems and in administration. Noteworthy, however, is the success which some States are now experiencing in statewide tabulations of selected data.

The publication in 1935 of "Recording of Local Health Work" (4) pointed the way to better forms in public health. Although the forms suggested therein did not always meet a specific need, the publication of the recommendations, which were developed through the cooperation of the Committee on Administrative Practice of the American Public Health Association, did emphasize the value of a consistent system of forms. It pointed up the value to be realized from careful planning and study of forms as an initial step in any record or statistics project.

Too Much Detail

Perhaps the greatest potential problem in the compilation of operating records is the temptation to gather too much detail and thus create a burdensome procedure. Operating records must be kept to the minimum of necessary data, or a Gargantuan procedure may result. The temptation to gather data affects nearly all.

It is so easy to speculate on what would be "nice to have," and let the items build up in the tabulations. Consideration of what practical use will be made of data should be foremost in the planning of operating statistics tabulations. The research worker may gather survey data on a sampling basis, or he may gather complete data during a limited period of time. Data which are only for information or for special purposes, or which have no application to administration or to the measurement or solution of a problem, should not be allowed to creep into permanent tabulations.

Then, too, the careful administrator will make certain that a statistical report does not become an end in itself. It is always possible for work to be done just for the benefit of the reports. To be justified, statistical data must be used.

Financial Records

Aid to the administrator in management of his organization is the primary objective of compiling cost data. Their most important use, administratively, is for period-to-period comparisons of performance costs for a particular activity. When costs increase significantly over those of an earlier period, investigation is suggested. If the increase in cost is justified and no action need be taken, it is often found that the increase may be caused by some factor which can be eliminated or corrected. Cost figures, therefore, are an indication of significant changes in program.

An administrator possessing valid financial information may choose which of two worthy programs will produce the most benefit when only a limited sum of money is available. Relative costs of each of several programs, particularly when units of service may be priced, are useful in evaluating the work. Detailed program costs are of value in seeking special grants, for such requests must be predicated upon a preconceived project in which the anticipated cost must be stipulated.

Aid to more accurate budgeting is a second objective of a cost system. At best, it is difficult to estimate in advance the financial requirements of an organization. In governmental budgeting it is often necessary to estimate expenditures as far ahead as 2 years. When costs

are known and the quantity of work can be estimated, a unit cost may be applied to these estimates as a basis for arriving at the appropriations to be requested. There are limitations in the use of unit costs in budgeting, and such use may be found to represent a two-edged sword. Many activities in public health are intangible and cannot be easily measured by traditional workload statistics. Easily understood by budget officials are the elementary statistics of man-hours, units of performance, or, more specifically in city or State administration, the number of licenses issued, the number of miles of highway constructed, the number of beds maintained, or other measurable activities. But in public health administration, we must prepare budget substantiations with an intelligent use of statistics so as to reflect accomplishments and progress, or at least measure the extent of a problem.

A third objective of a cost project is to inform the public of the cost of public health. Such figures are often useful in answering questions or criticism. We are constantly faced with a need for emphasizing the economies of prevention when the costs of prevention are compared with the costs of treatment.

Two general patterns are followed in the handling of governmental financial records. In one, which is commonly termed the line item budget, specific and separate appropriation is made for each individual job or group of jobs by organization units. Operating expenses and capital outlay for such units are also separately itemized, that is, a separate appropriation is made in each program for postage, telephone, printing, travel, and for all the various classes of operating expenses. A tabulation of expenditures against a line item budget produces a cost system of direct costs. If a unit were entirely self-contained, including all administrative expenses, the process of determining the cost of the program would be greatly simplified. Such, however, is rarely true.

The other general plan of budgeting is through means of a blanket appropriation for the total operation. It may be implemented by a cost accounting system wherein each item of salary and expenditure is charged to certain programs or functions. The appropriations are justified by estimates based on previous

experience and costs. In this pattern, costs are developed on a cumulative basis month-by-month.

However, the fiscal systems of most governmental agencies are a combination of these two general patterns, in varying degrees. One complication is that many of the personnel in public health agencies are engaged in generalized programs, rather than in specialized services. Nurses, for example, are involved in many or in the entire gamut of public health activities.

Other Record Needs

A new need for cost figures in public health operation has arisen for insuring the validity of categorical grant expenditures. The Public Health Service and the Children's Bureau have found it desirable to request much more detail from States in justification of congressional appropriations. The problem arises because through generalized services, the same personnel will work in the fields represented by more than one Federal grant.

For example, it is proposed in some situations to assign a unit cost to a nursing visit, based on a time and a cost study. Others will assign a unit cost to units of service, such as an immunization, or a clinic visit. In the laboratory field, validity can be verified by using the number of examinations of various kinds multiplied by the unit cost per specimen. Such unit cost can be determined either by an analysis in the laboratory or by accepting other cost data.

The need for justification of expenditures further underlines the desirability of greater attention to costs in public health agencies generally.

Unit Costs

In determining the costs of an activity in a generalized operation, the allocation of personnel time or salaries looms as the most important single factor. The problem is essentially one of the division of an individual's time on a basis of hours spent on the particular programs, and segments of programs, which he serves.

First Opinions, Then Observations ... Now Measurement and Analysis

—from remarks by Dr. Haven Emerson
at the summary session of the Second
Conference on Public Health Statistics

In the beginning there were ideas and opinions, then observations, and these led to measurements, and this required numbers which led the mind of man from fingers to stellar spaces and predictions of eclipses. Facts and records, once accepted, tempted minds into their logical deductions, so arithmetic and logic grew together and have been inseparable.

Whether for war or slave labor, man was counted in early times, and distances were measured on land and sea and in the heavens. Our common interest has been in the human family and its social aggregates, their origin, growth, and decay, and the causes of these. Our first early concern was with reproduction of our kind and their survival, and only in today's times is there concern with their endurance, with quality and content of life.

As the first job of the physician was with the sick, the first concern of the health officer was with loss of life and with known preventable causes. He was a lone soul crying in a wilderness of disease. He sought to prevent, and thereby assumed society's heaviest burden. He aimed at the demos, the socius, rather than

at homo, the man. He was government's early agent of the biological sciences, the community guardian against the errors of inheritance, environment, and acquired habits of work, shelter, food, play, and reproduction.

Today he is a symbol of that composite branch of local government, the health department. He is not a person, but the personification of a group of specialist professions and technologies—physician, engineer, nurse, laboratory director, epidemiologist, statistician, educator, dentist, and veterinarian.

Permit me to recall the fact that health departments have been created to avert preventable diseases, to protect the community against factors of environment affecting health, to teach the laws of human biology so that longer, deeper, broader lives can be assured and not merely survival of the babe. Care of the sick is best done by a physician sought by the person in need of prevention, diagnosis, and treatment. The health department is a multiprofessional team, and in that team the statistician is an incorruptible bulwark against bungling in life-saving and life-giving services.

Public health personnel are highly trained professionally. They are attuned to educational and research work, but often they are unfamiliar with the record requirements of a production operation. While it is relatively simple in a manufacturing plant to determine with a stopwatch the time taken on an assembly line for each of many detailed operations,

the stopwatch application is seldom appropriate to public health time studies.

Simple time studies may often be made in laboratory or in vital statistics procedures. In laboratories, a specific time usually may be established for each operation, and the beginning and ending points of such a function are rather clearly defined. They are less clear in

the routine recording of vital statistics data where the staff member must do a certain amount of interpreting, as the recording function is only partly mechanical. Beyond this, most public health operations are not routine but require deliberation, and thus an arbitrary evaluation in terms of time is difficult.

Nevertheless, reasonably satisfactory data may be accumulated in determining the standard or average time which an activity takes. A broad base is one safeguard to assure the validity of such data. Surveys to determine the average time required in a particular type of field visit should cover a long enough period so that seasonal effects will be truly reflected, and so that the extremes will be considered.

In determining personnel costs, other factors besides direct time must be considered: the cost of vacation salaries, of overtime, of retirement, and of office time occupied in conferences, in meetings, and in report writing. A special problem in time allocation is the handling of the travel time which an individual spends in transportation as distinguished from the cost of transportation.

To conduct a continuous record of time accounting becomes burdensome and not very fruitful. Surveys, special studies, or sampling techniques are an answer to the problem of record keeping.

Operating expenses form the next general component of the financial costs of a program. Here we find the actual costs of travel and transportation, as well as costs of supplies, laundry, stationery, forms, postage, and the many other necessary continuing expenses. General overhead includes such items as office rent, utilities, telephone, furniture, professional expenses, and other related items. These costs must all be considered on an appropriate pro rata in the total program cost.

The National Organization for Public Health Nursing carried on studies of the detailed costs in public health nursing since 1922 and provided methods of cost accounting whereby a nursing service may easily determine its costs. Part of its pioneering work was the development of a time study work sheet which accounts for a nurse's time in three categories: first, the "component," which is travel, preparation, or the activity itself; second, the "cost

center," or the type of activity which was conducted—a visit, a clinic, a school, group teaching, and related functions; and third, the "service," which is the program in which the nurse is engaged, such as infant health, tuberculosis, acute communicable disease, or others. The time of the nurse is divided; each unit of time shows all three elements.

For a time study to be valid, all time of personnel must be accounted for, so that the total allocated cost will add up to the total expenditures. This often requires the recording of unproductive time, and sometimes the accounting itself serves to encourage full production. Again, it is worth emphasizing that the problems of time recording in public health are much more complex than they are in simple production activities. For example, in an automobile repair shop a mechanic will stamp the time he begins the job and the time he ends the job on each job ticket, and the customer pays for all time between such recordings. While this is the theory applied to time studies in public health, it is much more difficult to put into practice.

A good reason for determining unit costs in some situations is to provide an appropriate basis for charging or billing the recipient of the service, as illustrated in the management of a hospital, or in a visiting nurse function. This element is usually lacking in public health activities.

Detailed costs, however, are not always necessary for good administration. Costs should be determined only when they are needed. A tabulation of the number of units of performance is often the only computation justifiable as an aid to administration. Care must be taken that the cost and statistical procedures do not build up so that they occupy more time than is necessary. Cost figures are of diluted value unless they are promptly recorded and are available. Timeliness of such data is exceedingly important if they are to be properly used.

Great care must be exercised in attempting to compare costs between several agencies. Because so many variables exist, comparisons must be thoroughly explored. Travel time in urban areas differs from rural areas. Differences in salary rates, in the purchasing value of the

dollar, and in the services available and the plans of operation make large variations in program costs. The same methods must be followed between various agencies if comparisons are to be made. Comparisons of costs are often deceptive if they are lifted out of context and compared without careful analysis.

Summary

Operating statistics may be a valuable aid to determining program costs. While the gross cost of a program may be estimated from some budgetary statements, in a generalized public health operation statistics are necessary to properly segregate such costs by program.

Statistics as to service or performance units are a basic element in public health administration, having much value for administrative, budgetary, and educational purposes. In many situations, it is unnecessary to perform the additional computations to determine the financial costs.

The time which each individual service activity requires can best be determined by surveys, studies, or sampling. Continuous routine reporting of detailed time breakdown should be avoided.

There are many hazards in the statistical procedures leading to the computation of program costs, but the principal one is the temptation to allow the reporting and recording procedures themselves to become arduous and unduly complicated.

The detail of cost data to be accumulated should be dictated by the needs for it. Excess tabulation of cost data should be avoided, since for many purposes the statistical data alone may be used profitably, without the dollar figures.

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Statistics and Statistical Methods in Public Health Practice

With this issue, *Public Health Reports* completes publication of 16 papers presented in June 1952 before the Second Conference on Public Health Statistics at the School of Public Health, University of Michigan. These papers, with a number of others, are to be assembled in a one-volume proceedings and will be available from the school at Ann Arbor. Listed below are the papers in the order in which they were published:

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| <p><i>Vistas in public health statistics</i>—by Clarence J. Velz, August 1952, pp. 725-728</p> <p><i>Application of statistical analysis in a health program</i>—by Ruth R. Puffer, August 1952, pp. 729-736</p> <p><i>Current methods of collecting statistics of health and health problems</i>—by O. K. Sagen, August 1952, pp. 737-740</p> | <p><i>Statistics in the administration of a State health department</i>—by John D. Porterfield, August 1952, pp. 741-746</p> <p><i>The administrative value of statistics to a local health officer</i>—by Berwyn F. Mattison, August 1952, pp. 747-754</p> <p><i>Needed improvements in mortality data</i>—by Iwao M. Moriyama, September 1952, pp. 851-856</p> <p><i>The survey approach to morbidity and health data</i>—by Halbert L. Dunn, October 1952, pp. 998-1002</p> <p><i>Sampling and field procedures of the Pittsburgh morbidity survey</i>—by Daniel G. Horvitz, October 1952, pp. 1003-1012</p> <p><i>The sampling of records</i>—by Robert E. Patton, October 1952, pp. 1013-1019</p> <p><i>Entomological survey methods</i>—by Robert E. Serfling, October 1952, pp. 1020-1025</p> | <p><i>A sample survey of home injuries</i>—by F. M. Hemphill, October 1952, pp. 1026-1034</p> <p><i>Usefulness of communicable disease reports</i>—by Ida L. Sherman and Alexander D. Langmuir, December 1953, pp. 1249-1257</p> <p><i>Birth statistics in maternal and child health programs</i>—by William Haenszel, January 1953, pp. 71-80</p> <p><i>Statistics in a health department medical care plan</i>—by Matthew Taback and Huntington Williams, February 1953, pp. 157-166</p> <p><i>Public health operating statistics</i>—by Robert G. Webster, May 1953, pp. 467-473</p> <p><i>First, opinions, then observations . . . Now measurement and analysis</i>—from remarks by Dr. Haven Emerson at the summary session of the Second Conference on Public Health Statistics, May 1953, p. 471</p> |
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Fog and Deaths in London, December 1952

By JOHN A. SCOTT, M.D., D.P.H.

DURING the first half of December 1952, the London area experienced periods of fog, one of which was of an intensity rarely reached in recent times. This fog was widespread and persisted for a considerable continuous period, from December 5 through December 8.

Its onset was determined by the meteorological factors of almost complete absence of wind or air movement and low temperature, which produced what is technically described as an "inversion" whereby the normal upward air circulation by convection currents was arrested. Hence at ground level and for many feet above, there was no air movement, and smoke, sulfur oxides, and other air contaminants increased to concentrations much above those normal for the winter season.

Atmospheric Pollution and Temperatures

In addition to the many monthly assessments of atmospheric pollution made at several observation stations, which, of course, yield only monthly averages and hence do not show the daily variations, the chemical branch of the London County Council public health department maintains daily observations of smoke and sulfur dioxide at three places: London County Hall; Northern Outfall Works,

Beckton; and Southern Outfall Works, Crossness. The figures for the determinations at London County Hall for the period November 16 through December 27, 1952, are shown in table 1.

As a basis of comparison, it should be stated that the summer (June) daily average concentration of smoke is about 0.12 milligram per cubic meter of air; of sulfur dioxide, about 0.07 part per million. It will be seen from the table that the degree of atmospheric pollution in winter is considerably greater, as would be expected. The figures for November 1952 are generally of the order usual at that time of year, but a sharp rise in pollution occurred on December 5. Maximum averages were reached over the weekend, ending at 10 a. m., Monday, December 8; the average concentration of smoke was 4.46 milligrams per cubic meter of air, and of sulfur dioxide, 1,339 parts per million. These are exceptionally high figures, indeed the highest which have been traced in our records, those for sulfur dioxide dating back to 1932. For the 6-day period from December 5 through 10 the atmospheric condition was continuously bad, as will be seen from table 1.

The mean daily temperatures recorded at Kew Observatory for the same period, together with the departures from the average experience of the past 80 years, are shown in table 2. On December 5 there was a striking fall in the temperature, and low temperatures continued until the fog lifted.

Dr. Scott, who has served as medical officer of health in Fulham, Barnsley, and Shipley in England, became medical officer of health of the London County Council in 1952. He succeeded Sir Allan Daley, whose deputy he had been since 1945. Dr. Scott submitted the report appearing here to the council's public health committee on January 27, 1953.

Daily average concentrations of atmospheric contaminants and daily temperature departures from 80-year average, London, November 16 through December 27, 1952.

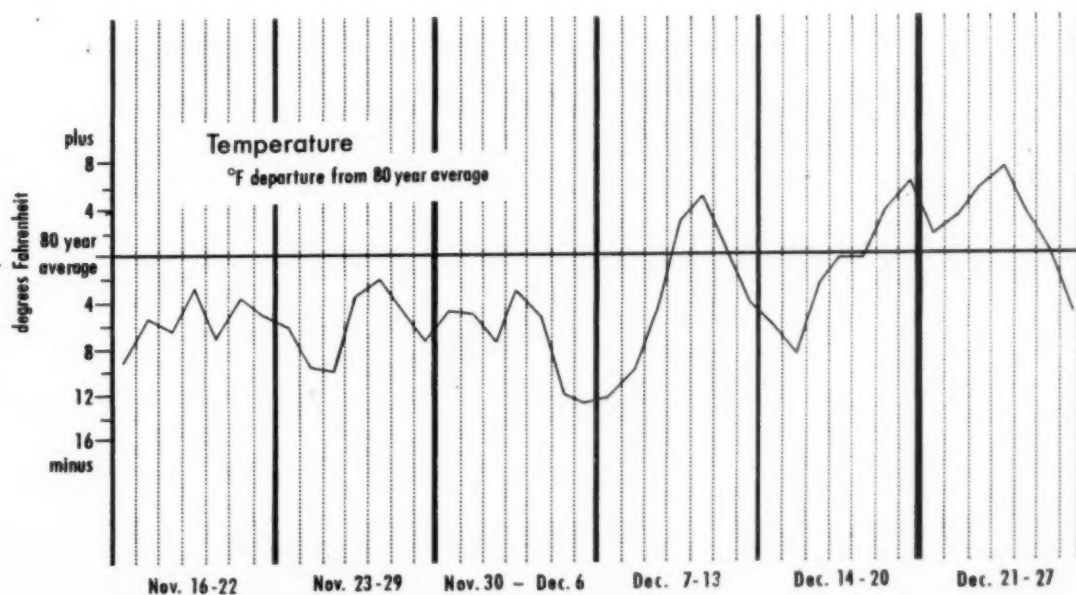
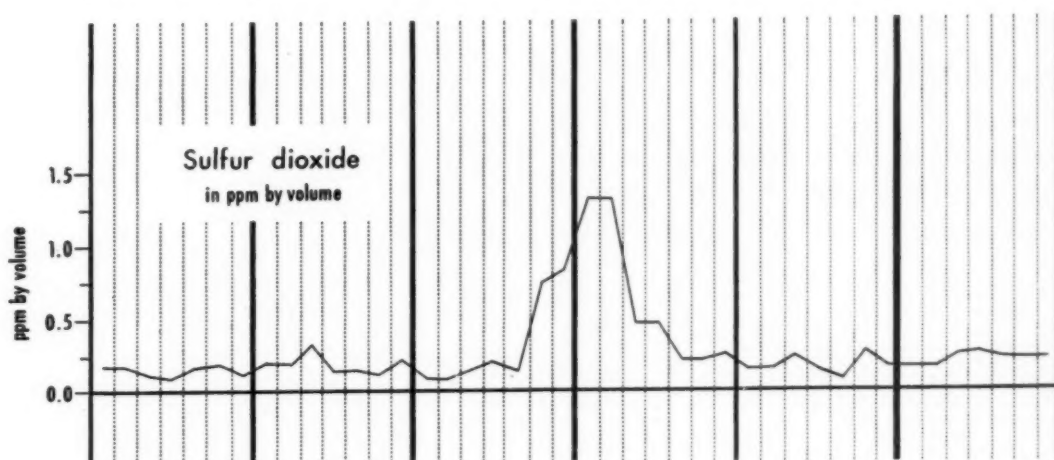
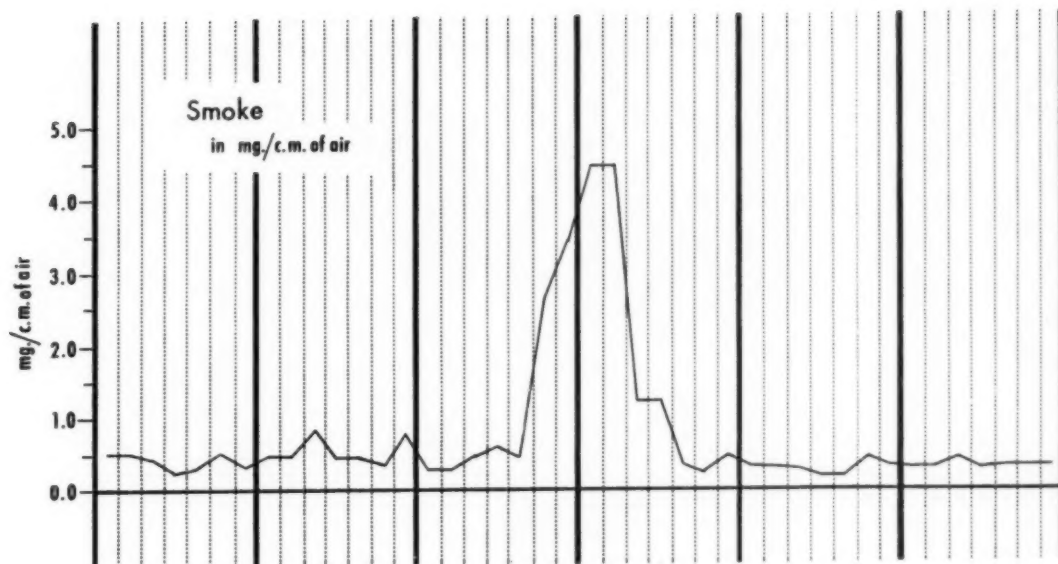


Table 1. Daily average concentrations of smoke and sulfur dioxide, according to observations at London County Hall, November 16–December 27, 1952

Day and date, November 1952	Smoke ¹	Sulfur dioxide ²	Day and date, November– December 1952	Smoke ¹	Sulfur dioxide ²	Day and date, December 1952	Smoke ¹	Sulfur dioxide ²
Sun., 16.....	} ³ 0.53	} 0.179	Sun., 30.....	} ³ .30	} .090	Sun., 14.....	} .32	} .155
Mon., 17.....			Mon., 1.....			Mon., 15.....		
Tues., 18.....			Tues., 2.....			Tues., 16.....		
Wed., 19.....			Wed., 3.....			Wed., 17.....		
Thurs., 20.....			Thurs., 4.....			Thurs., 18.....		
Fri., 21.....			Fri., 5.....			Fri., 19.....		
Sat., 22.....			Sat., 6.....			Sat., 20.....		
Sun., 23.....	} ³ .50	} .193	Sun., 7.....	} ³ 4.46	} 1.339	Sun., 21.....	} .33	} .170
Mon., 24.....			Mon., 8.....			Mon., 22.....		
Tues., 25.....			Tues., 9.....			Tues., 23.....		
Wed., 26.....			Wed., 10.....			Wed., 24.....		
Thurs., 27.....			Thurs., 11.....			Thurs., 25.....		
Fri., 28.....			Fri., 12.....			Fri., 26.....		
Sat., 29.....			Sat., 13.....			Sat., 27.....		

¹ Expressed as milligrams of black suspended matter per cubic meter of air. ² Expressed as parts per million by volume. ³ Average for the time period included.

Increase in Deaths

The deaths registered weekly in the administrative county of London from November 16, 1952, to January 10, 1953, were as follows:

Week ending	Registered deaths
Nov. 22, 1952.....	753
Nov. 29, 1952.....	853
Dec. 6, 1952.....	945
Dec. 13, 1952.....	2,484
Dec. 20, 1952.....	1,523
Dec. 27, 1952.....	1,029
Jan. 3, 1953.....	1,372
Jan. 10, 1953.....	1,216

For the weeks ending November 22 and 29 and December 6, the number of registered deaths was normal for the time of year, although during the vagaries of the winter weather it is usual to find as many as 1,100 registered deaths in occasional weeks. But for the week ending on December 13 the number of registered deaths rose to a figure far above the normal winter maximum and, although somewhat less for the weeks thereafter, the number continued abnormally high. (The apparent drop for the week ending December

Table 2. Meteorological observations at Kew Observatory, November 16–December 27, 1952

Day and date, November 1952	Mean daily temper- ature (° F.)	Depart- ure from 80-year average (° F.)	Day and date, November– December 1952	Mean daily temper- ature (° F.)	Depart- ure from 80-year average (° F.)	Day and date, December 1952	Mean daily temper- ature (° F.)	Depart- ure from 80-year average (° F.)
Sun., 16.....	35.4	-9.1	Sun., 30.....	37.4	-4.8	Sun., 14.....	35.2	-6.0
Mon., 17.....	37.8	-5.5	Mon., 1.....	36.9	-5.2	Mon., 15.....	32.0	-8.8
Tues., 18.....	36.3	-6.8	Tues., 2.....	34.2	-7.7	Tues., 16.....	38.3	-2.8
Wed., 19.....	40.6	-2.9	Wed., 3.....	39.0	-3.3	Wed., 17.....	40.8	-3
Thurs., 20.....	36.5	-7.0	Thurs., 4.....	36.5	-5.4	Thurs., 18.....	40.5	-3
Fri., 21.....	39.2	-3.7	Fri., 5.....	29.5	-12.1	Fri., 19.....	43.9	+3.8
Sat., 22.....	37.9	-5.1	Sat., 6.....	28.9	-12.8	Sat., 20.....	45.5	+6.2
Sun., 23.....	36.7	-6.3	Sun., 7.....	28.9	-12.3	Sun., 21.....	41.5	+1.9
Mon., 24.....	33.3	-9.7	Mon., 8.....	31.5	-10.0	Mon., 22.....	43.0	+3.3
Tues., 25.....	32.7	-9.9	Tues., 9.....	36.0	-4.5	Tues., 23.....	44.8	+5.9
Wed., 26.....	38.5	-3.5	Wed., 10.....	43.3	+2.7	Wed., 24.....	46.9	+7.3
Thurs., 27.....	39.7	-2.0	Thurs., 11.....	45.1	+5.0	Thurs., 25.....	43.2	+3.9
Fri., 28.....	37.4	-5.1	Fri., 12.....	40.1	-1	Fri., 26.....	40.3	+2
Sat., 29.....	35.1	-7.4	Sat., 13.....	37.2	-4.2	Sat., 27.....	35.4	-5.1

Fog Over London

"A report on the London fog of December 1952 has now reached the London County Council and it makes grim reading. In the past hundred years only the peak week of the influenza pandemic in November 1918 produced more deaths over the expected normal than did the man-made fog of 2 months ago. Even the cholera epidemic of 1866 could not quite equal it.

"Analysis of the deaths registered shows that extremes of life were more affected than the middle groups and that the increase in deaths was associated almost entirely with disorders of the respiratory or circulatory systems. The January 31, 1953, issue of *The Lancet* contains an interesting account by a general practitioner of the effects of the fog on his Beckenham practice. Upper respiratory toxic irritation appears to have been common and affected the active as well as the older and less fit whilst lower respiratory affection occurred amongst the more elderly and those with a previous

history of chronic chest trouble. Dr. Fry notes that the majority of these illnesses started fairly abruptly on the third or fourth day of the fog.

"This combined picture of mortality and morbidity is similar to that presenting itself at Donora and in the Meuse Valley. It is the picture presented by the London fog of 1948 and it is a reiteration of what the medical officers of health of Glasgow, Leeds, Manchester, and other industrial cities have been reporting in greater or lesser degree from time to time for several generations. In other words, the London fog of December 1952 was no strange new phenomenon. It was no acute epidemic caused by a hitherto unrecognised virus nor was it a visitation of some known pathogen against which we had no defence. It was simply the occurrence of a well-known meteorological phenomenon in an area where the toxic products of combustion are vomited in excess into the air and as a result the upper and lower respiratory

systems of the local inhabitants were irritated and death occurred amongst those with pre-existing cardiovascular and respiratory disease.

"This is in parallel with typhoid at Croydon and Malden and paratyphoid at Bournemouth and Aberystwyth. What does it matter if in the one the vehicle was air and in the others water, milk, and ice cream? The result was the same. Epidemic illness of a preventable nature occurred. . . ."

—Excerpt from an editorial appearing in *The Medical Officer*, London, February 14, 1953, p. 73.

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Other London fog reports appearing recently in *The Lancet*, include: "December Fog in London and the Emergency Bed Service," by G. F. Abercrombie, January 31, 1953, pp. 234-235; "Effects of a Severe Fog on a General Practice," by J. Fry, January 31, 1953, pp. 235-236; "Mortality in the London Fog Incident, 1952," by W. P. D. Logan, February 14, 1953, pp. 336-338.

27 is due to the usual delay in registration over Christmas and not to a decline in deaths.)

The general death rate for the week following this fog and cold was slightly greater than that associated with the severe fog of 1873 and was comparable with the rates experienced at the peak mortality of major epidemics, as shown in table 3.

It is apparent that although the death rates immediately following the fogs of 1873 and 1952 were almost the same, the increase was much greater in 1952. The increase in 1952 was larger even than that attributable to cholera in the

week of highest mortality in the summer of 1866.

Deaths by Age and Cause

Analysis of the deaths registered weekly from November 16 through December 27, 1952, shown in table 4, indicates that the sudden increase in mortality, although more pronounced among infants and the elderly, was not confined to persons of any particular age. Among infants aged 4 through 52 weeks and among persons over 55 years, three times as many deaths were

Table 3. Registered deaths per million inhabitants in the administrative county of London during specified weeks

Week ending	Deaths	Normal for period and season	Excess over normal
Aug. 4, 1866 (cholera)-----	876	450	426
Dec. 20, 1873 (fog)-----	713	470	243
Nov. 9, 1918 (influenza)---	1,085	300	785
Dec. 13, 1952 (fog)-----	745	300	445

registered in the week ending December 13 as could be expected from the figures for the previous 3 weeks, and among persons of all other ages, rather over twice as many.

The causes associated with the excess deaths were confined almost entirely to disorders of the circulatory or respiratory systems (see table 5). Compared with the average per week for the previous 3 weeks, deaths from bronchitis in the week ending December 13 were 10 times as many; from pulmonary tuberculosis, $4\frac{1}{2}$ times as many; and from other respiratory diseases, nearly 6 times as many. Deaths from cancer of the lung rose rather less, to nearly twice as many; those from disorders of the heart and circulatory system were nearly three times as many. Deaths from any other defined

cause showed no significant increase with the exception of gastroenteritis, deaths from which increased considerably among children under 1 year old; it is, however, quite possible that these cases of gastroenteritis were secondary to an upper respiratory infection.

This sudden high mortality did not alter the normal pattern of deaths from the different causes at different ages except insofar as it was an increase confined to respiratory and circulatory diseases; at no age were any excess deaths registered from causes which are not normally characteristic of that age during winter. Deaths from influenza, although they rose markedly in the week after the fog, rapidly fell back to a normal winter level and at their highest were well below the numbers to be expected in a developing epidemic.

Detailed comparison of the deaths following the fogs of 1952 and 1873 is not possible owing to considerable changes in the methods of classifying causes of death. But it is clear that the effects were broadly similar. In 1873 as in 1952, it was the respiratory and circulatory diseases which showed the greatest jumps in mortality; and in 1873, although the death rates increased at all ages, the increase was much greater among the very young and the old. An accurate comparison between the se-

Table 4. Registered deaths in administrative county of London, by age group, week ending November 22 through week ending December 27, 1952

Age	Number of deaths for week ending						Average number of deaths per week for weeks ending November 22, 29, and December 6	Percentage of average of first 3 weeks for week ending		
	Novem-ber 22	Novem-ber 29	Decem-ber 6	Decem-ber 13	Decem-ber 20	Decem-ber 27		Decem-ber 13	Decem-ber 20	Decem-ber 27
<i>Weeks</i>										
0-4-----	13	22	16	28	19	12	17. 0	165	112	71
4-52-----	5	9	12	26	15	11	8. 7	300	173	127
<i>Years</i>										
1-4-----	11	5	6	7	13	7	7. 3	96	177	96
5-14-----	4	3	4	6	6	2	3. 7	164	164	55
15-24-----	4	3	9	7	14	7	5. 3	131	263	131
25-34-----	14	7	16	28	17	11	12. 3	227	138	89
35-44-----	28	22	36	64	29	34	28. 7	224	102	119
45-54-----	85	61	80	204	96	83	75. 3	271	127	110
55-64-----	118	152	157	448	251	167	142. 3	315	176	117
65-74-----	229	226	254	717	444	258	236. 3	303	188	109
75 and over-----	242	343	355	949	619	437	313. 3	303	198	139
All ages----	753	853	945	2, 484	1, 523	1, 029	850. 3	292	179	121

Table 5. Registered deaths in administrative county of London, by certain causes, week ending November 22 through week ending December 27, 1952

Cause	Number of deaths for week ending						Average number of deaths per week for weeks ending November 22, 29, and December 6	Percentage of average of first 3 weeks for week ending		
	No- vember 22	No- vember 29	De- cember 6	De- cember 13	De- cember 20	De- cember 27		De- cember 13	De- cember 20	De- cember 27
Pulmonary tuberculosis	18	19	14	77	37	21	17.0	453	218	124
Lung cancer	38	27	45	69	32	36	36.7	188	87	98
Heart disease	225	272	273	707	389	272	256.7	275	152	106
High blood pressure	12	17	19	47	36	21	16.0	294	225	131
Other diseases of circulatory system	27	23	26	46	31	32	25.3	182	123	127
Influenza	1	7	2	24	9	6	3.3	720	270	180
Pneumonia	31	28	45	168	125	91	34.7	486	363	264
Bronchitis	46	73	76	704	396	184	65.0	1,083	609	283
Other respiratory diseases	10	8	9	52	21	13	9.0	578	233	144
Ill-defined causes	19	26	25	79	35	37	23.3	339	150	159
All other causes	326	353	411	511	412	316	363.3	140	113	87
All causes	753	853	945	2,484	1,523	1,029	850.3	292	179	121

verity of the 1873 and 1952 fogs cannot be made since no recordings of the condition of the atmosphere are available for 1873. But some idea of their relative intensities can be obtained since it so happens that in both years the fog occurred while the Smithfield show was being held, and in both years deaths of animals in the show were recorded. The *London Times* of December 12, 1873, reported that about a third of the animals had to be removed; that some were saved by being carried quickly into the clearer air of the country but a considerable number had to be slaughtered; and that asphyxiation of animals occurred in London cow-houses and in the metropolitan market on De-

cember 11. In 1952, the breathing difficulties experienced by otherwise healthy animals owing to the foggy atmosphere received wide publicity.

Summary

During the week following the fog and very low temperatures of December 5, 6, 7, and 8, 1952, abnormally large numbers of persons at all ages died from causes connected with difficulty of breathing. This was very similar to what had happened immediately after a comparable fog in 1873, but the rise in deaths in 1952 was much greater and was, in fact, as great as that during the worst week of the last cholera epidemic.



Health Developments in Rural America, 1953

"Widening the Road to Health" was the theme of the eighth National Conference on Rural Health sponsored by the Council on Rural Health of the American Medical Association. More than 700 medical, farm, and community leaders, representing several million rural area people, attended the conference at Roanoke, Va., February 27 and 28. Our report of the meeting begins with a review of conference activities since 1946 by Dr. Crockett, chairman of the Council on Rural Health. It includes in news-summary form reports of seven other papers and, in brief, a review of rural dental problems. Two additional briefs summarize the viewpoints on rural health councils of a physician and of a State public health director. These were given at a preconference meeting of State committees on rural health. The seventh National Conference on Rural Health was reported in Public Health Reports, May 1952, pp. 479-483.

Looking Back To Look Ahead in Rural Health

By F. S. CROCKETT, M.D.

A REVIEW of the past 8 years may help us in forecasting where we go from here. Let us, in part, recreate the atmosphere in which we lived in 1945. A great world war was ending. Nearly all civilian activities had suffered change and dislocation. This was especially true in health and medical care. Some 60,000 physicians had entered the armed services, in many instances leaving communities without a physician or with an aging one.

Earlier, in the thirties before World War II, the decreasing number of physicians in the small towns was impressive. This phenomenon had been slowly developing since the beginning of the century. The element of need seemed increasingly urgent. The big question was what could be done about it?

Dr. Crockett, Lafayette, Ind., is chairman of the American Medical Association's Council on Rural Health.

The American Medical Association formed a committee on rural health, predecessor of the present council, in response to an invitation from the American Farm Bureau Federation, an organization representing at that time about 1 million families from farms in practically every State. Individual physicians were fully aware of the rural health situation and were anxious to make available all the resources and information in their possession required for study and solution of the problems.

In the organizational plan for the medical profession eight areas of rural America having comparable rural health problems were recognized. A member of the committee living in each area was given responsibility for developing rural health activity suitable and acceptable to the people in the area. This intimate knowledge of sectional problems was augmented by advisory members. We first invited advisory members from the Farm Bureau, Grange, Co-operative Milk Producers Federation, Farmer's

Union, and Farm Foundation of Chicago. Later the Committee on Policy and Planning of the Land-Grant Colleges and the American Agricultural Editors Association gave us advisory members. We have received recognition and support from constituent State medical societies. Forty-three State rural health committees have stimulated interest in providing service for their rural areas. They have done much to organize State and local health councils, enlisting the support of a large segment of the citizens. The State committees have received major support from many sources, especially farm organizations, which have also organized State and local health committees.

Ground Rules

Into conferences such as this one flow the combined thinking and planning of the rural and professional leadership of the whole country. This combination of skill and experience justifies our claim that rural health promotion has become truly a citizenship responsibility—a duty resting upon each citizen to contribute, to the fullest extent of his knowledge and experience, the wisdom required to make any community effort succeed.

The first national rural health conference, held in Chicago in March 1946, had several unique features. For instance, it was not a meeting of physicians to solve a health problem. It was a meeting of physicians and laymen to discuss and solve their mutual health problems—tacit recognition that rural health is a job for the citizen and that it requires community cooperation. The conference was national in scope—some 3,500 invitations were extended to all groups thought interested in the problem. Nearly every State was represented.

The ground rules for the conference called for an open forum in which everyone was free to express his opinions. It was believed that through a multitude of ideas a more complete picture would evolve. The conference was exploratory with no preconceived ideas to be supported. Discussion from the floor was deemed

important, equal to the prepared addresses.

The American Medical Association, while sponsoring the conference, claimed no privileged position. Constructive criticism was expected and desired. There were to be no decisions by majority vote. Truth cannot be established that way. Instead, areas of agreement were sought. Disputed problems have often found solution with the passage of time and more experience. These ground rules have not been changed. They apply with equal force to this eighth conference.

Three statements epitomize some of the thinking at the first conference.

The late Ransom Aldrich of Mississippi, first chairman of the Rural Health Committee of the Farm Bureau, pointed out, "The chief problem of medical care in rural America is cost. In my county, doctors charge a dollar per mile. The low income group in rural America simply does not get medical service from that kind of charge."

Dr. L. W. Larson, North Dakota, a member of our committee, remarked, "Rural health has always been a problem. While there has been considerable improvement, two phases remain unsolved—the availability and the cost of medical care. (a) Availability means bringing the doctor to the patient or the patient to the doctor. (b) The cost will be less if the patient can go to the doctor. The use of prepayment plans will spread the cost and reduce the cost to the individual."

Leland B. Tate, of the Farm Foundation, proposed that better medical care and health service, and health education should bring to the individual: (a) "Knowledge and understanding of what is desirable for maximum health, and (b) insight into ways and means of getting and paying for adequate health and medical services."

Three basic factors, that still concern us, were noted and emphasized at the first conference: medical services; the maintenance of health through education of the individual; and the economic situation that exists at the moment affecting various segments of rural people.

The Common Effort

These are, in part, the progressive steps by which we have built the National Council on Rural Health and mobilized existing related professional, educational, and civilian groups for a common effort on the national, State, and local levels. What then is this common effort?

Our objective in this common effort has been the benefit of the individual and his community. The technique to be employed was, we believed, important—as important as is the objective. This benefit was not to be had free, but was to be earned by the community and by the individual. By this technique, based on rugged individualism, on personal pride in one's ability to care for himself, on meeting common problems through group action, the objective was to be won.

This basic philosophy and the methods employed in its achievement reflect the thinking of the medical profession. I believe it is acceptable to our advisory groups. We have given much thought to this whole matter. Where does the local physician, of the county medical society, fit in? True, they are the experts in health matters, but no community problem can be solved by a minor segment of the population.

We have come to believe that this is not the physician's job; it is not a job for the medical profession; it is not a public health service job; it is not a layman's job. It is a job involving all citizens collectively and equally—one in which each contributes for the common good his knowledge and experience and in return shares in a better place in which to live and rear his family.

We believe we should take advantage of the strength accruing from group action. Citizens organizations lend themselves well to health promotion, and many have been formed on the county basis in many States.

The trading center, and its surrounding trade area, is the logical health council area. It has been observed that people get medical services where they go for other commodities and services. Since the county is a convenient area surrounding the trade center, or county seat, we have come to call these local organizations county health councils.

County health councils are truly local. This is the area where people live. This is where they can conduct their local and community affairs to suit themselves. This is the level where local self-determination permits the fullest expression of individual thinking. Schools, churches, highways, public health services, law enforcement—everything entering intimately into daily living—reflect the individual's attitude toward, and concept of, his responsibilities as a citizen.

A county health council should be organized whenever a large majority of the local leaders and local citizens are ready for it. In Indiana, for example, 34 counties out of a total of 92 have health councils. Some have been very active; others shade down through varying degrees of activity. What we need in Indiana is an overall State organization interested in stimulating well-directed activities originating locally in response to local needs. A number of States have such State health councils. They have followed no set pattern, but each has contributed richly to the fund of general experience.

Any organization able to accomplish what the people want done is a good and sufficient organization. It is a well-recognized principle, however, that the best public opinion exists where the greatest number think as we do. Any organizational plan that secures a favorable public opinion and wide popular support is to be preferred. This is the way our common effort can be, and has been, implemented. This is the highway we wish to broaden now.

Steps on the Road

A brief review of the succeeding national conferences will complete the picture of our progress.

The second conference studied methods of bringing and holding doctors in rural areas; building hospitals and diagnostic facilities; medical care for low income families; and prepayment plans for medical and hospital care.

The third conference considered the health problems of rural youth. We learned that the country was no better and no worse than the

city. Each to be a healthful place to live must utilize well-known health measures.

The fourth conference studied the rural and farm environment; the accident rate; animal diseases affecting man; soil depletion effects on nutritive crops; and use of newer chemicals in pestilence control and possible poisonous effects.

The fifth conference was the first to be highlighted with a theme. A courageous "Let's Do Something About It" dominated the program thinking in 1950. It was pointed out that the community health council, if properly organized with broad interests, wide support, and wise leadership, will supply the channel through which any community can solve its own health problems in its own way and to its own satisfaction.

"Why Wait—Let's Do It Ourselves" was the sixth conference theme calling us to further action. Success stories of State and county health council accomplishments cited examples of vision, leadership, and energy exhibited under the stimulus of good neighbor and good citizenship practices. It was a dramatic confirmation of previous years' studies and recommendations.

The theme at last year's seventh conference of "Help Yourself to Health" was an action slogan in the best rural tradition. Discussions of successful planning in a number of States, and recitals of "take home" ideas garnered from the program, afforded ample opportunity for thorough discussion from the floor.

Accomplishments

The national conferences have created a receptive climate for a number of developments. Several come readily to mind such as Blue Cross and Blue Shield and Farm Bureau and Grange sickness insurance; Hill-Burton aid to hospital construction; placement service for physicians in communities wanting physicians; nurse recruitment plans; organization of State and county health councils, and organization of rural health committees by State and county medical societies.

Health educators have been added to facul-

ties of several land-grant colleges. At least two States have emphasized general practice training of medical students. Some State plans include graduate instruction which will bring the medical school to many rural physicians who cannot leave their patients without medical care while taking refresher courses.

Surveys of local health conditions by lay personnel in local health councils, under professional guidance, is a most revealing activity. We have survey reports from Columbiana County and Clinton County, Ohio; Parke County, Ind.; and Madison County, Idaho. No doubt there are other reports that have not reached us.

The compilation of much pertinent material by the Council on Rural Health, available on request to the council's secretary, should prove helpful to anyone developing a home program.

Another accomplishment of the council which has done much to strengthen and give common direction to many agencies interested in promotion of better health for rural America has been the addition of a field director to the staff. Members of the council are all working physicians who take time off from earning a living whenever they do anything to promote this cause. This limiting factor has been removed by having a full-time representative whose duty it is to go into every State and acquaint all interested persons and groups with the council and with each other. In obtaining a field director, or roving ambassador, the council's effectiveness has been enhanced manifold. We like to refer to him as our catalytic agent, so many desirable reactions result when he is around that somehow never happened before.

A unity of purpose and performance by all of us engaged in stimulating rural people to attain a fuller and more healthful life is created by our knowing each other better and working together. This is one of our objectives.

In charting the direction we have traveled these last 8 years, we have been guided by a realization that we live in a real world; that each of us must live and act as a responsible person; that the world does not owe us anything except opportunity—opportunity to solve

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our own problems in our own way and to our own satisfaction.

The Future Problem

Final solution of the three basic factors of medical care, health maintenance, and purchasing power uncovered at the first conference is our future problem.

Medical Care

Medical care is that service we require when we are sick. This we can not give to ourselves. We need well-trained doctors and nurses and well-equipped hospitals. Since 1946 this situation has improved. Many doctors have settled in the small towns. I doubt if there are now many prosperous communities, where desirable living conditions exist, without needed medical personnel. It is in communities in the lower income level that the greatest challenge exists—places where poor schools, churches, roads, homes, and farms go hand in hand with inadequate medical care.

Health Maintenance

Health is more than freedom from disease. It should have a positive quality, abundant and vital in character. We should think of health maintenance as consisting of all those things we learn to do for ourselves so that we can keep the good health we now have. This is our own responsibility. We owe it to ourselves. It is no other person's duty to maintain our health for us unless we become dangerous to the health of other people. The individual is capable of doing many things needed to maintain his health. Of course, there are some health problems that require community action. The local public health service was created for this purpose and needs and deserves the support of all citizens. It is an official body created and governed by law. A volunteer organization is more resilient. It can make and change its own rules to meet quickly any emergency. There is much that such a citizen's council can do to make everyone health conscious. This is not a new or untried idea. In many counties in a number of States such groups have done excellent jobs

in cleaning up health hazards and teaching the simple rules of health.

Purchasing Power

The third basic factor involves purchasing power—the “take home pay” in rural areas. Price parity is equality of earning opportunity. Its realization would go far to solve the medical care problem and payment for the service. There are today few prosperous rural communities without needed medical coverage. However, they too will benefit from local organization. There is more to this problem than getting a physician and paying him for his skill. Public opinion can be mobilized in support of many improvements in hygiene, sanitation, and other health measures.

Sharing and spreading the costs of medical care through insurance is of interest to everyone, rich or poor. In the purchase of goods and services, a sliding price scale cannot be applied as it is in taxation. Great progress continues in the insurance coverage of rural people and we can entertain a reasonable hope of the eventual coverage of 60 percent or more of those who should have it. The greatest challenge is how to bring the benefits of prepayment to the 40 percent.

To these problems, there is no easy, simple answer. All the points I have made are debatable. There is an honest difference of opinion. But there is much evidence warranting the conclusion that the future trend is away from “statism”, with a return to individual initiative, to voluntary organization on the local, State, and national level for the meeting of social needs. The promotion of local organization for this purpose by the past seven conferences seems timely and even prophetic as we view it now.

We must continue to encourage county or community organization. Continuing education is the best method for achieving our goal of individual and local self-help. It is the sure foundation for State and national solution of health and other social problems. There is no substitute for a well-informed citizenry.

In taking a long look ahead, physicians will do well to follow Dr. Louis H. Bauer, president

of the American Medical Association. Recently he urged the expansion of voluntary health insurance to cover the aged (those over 65 years of age) and those suffering from illness of long duration; promotion of volunteer organizations so that we can have a better distribution of physicians through establishing needed facilities; making good medical care for the indigent available everywhere; extension of public health coverage to areas lacking it; and protection of the public so that people may always obtain the services of a physician.

During the past 8 years we have been making progress in line with these suggestions and the potentials are much greater than anything that has been accomplished up to now. We are given an unprecedented opportunity for service to society. Our goal is the well-served, well-informed community. We must reach our goal by showing that the way along the ever widening highway to health is gained by patient and sturdy trudging. It is not a journey that can be made by thumbing our way.

Highlights of the Conference

Group Health Insurance Advised for Farm Families

Group health and accident insurance gives farm families an economical way of meeting medical care costs, Carll S. Mundy, M.D., Toledo, Ohio, vice chairman of the Council on Rural Health told the Eighth National Conference on Rural Health.

Dr. Mundy pointed out that group coverage with payroll deductions is the most economical form of insurance. This method, he said, has been adopted by many industrial and business concerns.

"Since payroll deduction is impossible for farm families, some other satisfactory and economical arrangement must be made to collect and forward premiums for the group," he added.

Farm organizations and church groups have served this purpose, he said. "Enrolling all the depositors in a rural bank and authorizing the bank to deduct premiums from the contract holder's account and to forward them to the insurance company is another method that is working well in many communities. The prime requisite in each instance seems to have been imagination and leadership."

Dr. Mundy stated a group must be not only qualitatively representative, but quantitatively it should in-

clude more than 50 percent of the farm families in a community or locality.

He also pointed out that the farmer would have a more economical and better coverage for his purpose if he took advantage of the deductible principle which eliminates the insurance of small, frequently recurring and unpredictable items.

"The greater the number of small items we permit to remain in this deductible category, the cheaper will be the insurance," he said.

According to Dr. Mundy, the hospital bill probably will be the largest item in the cost of a major illness. Surgical fees are usually the second largest item when surgery is performed.

"There are many sources of insurance available," he said. "Commercial carriers operate in most States. In many States there are companies sponsored by the Farm Bureau, the Grange, or both. These, together with Blue Cross and Blue Shield, offer a variety of contracts that should satisfy the needs of most groups."

Facts on Food Values Needed in Rural Areas

Farmers need to know more about food values, Janet L. Cameron, Blacksburg, Va., food and nutrition

specialist for the Virginia Polytechnic Institute's agricultural extension service, told the conference.

Miss Cameron reported that a survey in Appomattox County, Va., a fairly typical rural area, showed that three groups of foods were seriously lacking in the diets of more than half of the families. These are tomatoes, citrus fruits, and other vitamin C foods; milk and milk products; and green and yellow vegetables.

"Even though farm families usually produce much of their vegetables and part of their fruit and meat, the largest part of their income goes for food," Miss Cameron said. "Therefore, a big responsibility in nutrition is to help them understand food values in order to get the most for their dollars."

"It may help our people to know that green cabbage is now much cheaper than lettuce, yet just as nutritious; that pork liver is far more nutritious than sausage or ham, yet the cost is much less. By the same token, beef liver or heart has more iron and vitamins than beef steak or roast, yet it costs far less. If the cost of fresh milk limits the amount a family can use, canned or dry milk is equally nutritious."

"Lack of income may limit or prevent some families from getting an adequate diet, but most farm families can have a garden and produce enough vegetables to give them two

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groups of food which studies show they lack."

Focus on Youth

Miss Cameron said progress in nutrition since World War I has prevented or alleviated dietary deficiency diseases, such as scurvy, rickets, and simple goiter. Synthetic nutrients have made it practical to improve common foods as a means of preventing deficiency diseases in large populations, she added.

Studies show that the poorest fed member of the family is the adolescent, especially the girl, Miss Cameron pointed out, adding: "Somewhere along the line we have failed to establish in her the good eating habits of her childhood, or we have not helped her to see the importance of nutritious foods for her happiness and success in the years ahead."

New Hospital Achieved By Community Action

The record of a small town—with a population of less than 5,000 people—successfully passing three bond issues to build a 55-bed hospital was reported by Lilyan C. Zindell, Perryville, Mo., administrator of the Perry County Memorial Hospital.

Everyone seemed to want to participate in the project, Miss Zindell said. The Missouri Farm Bureau Federation gave a helping hand. Former residents of Perry County living in St. Louis also contributed.

The hospital has attracted four young physicians into the community. In less than 2 years, 800 babies have been delivered without a maternal death. Local businessmen and farmers serve on the board of trustees, she said.

Hospital Volunteers

Since the hospital was opened a group known as the "hospital volunteers" have sewed several thousand items needed by the hospital and have served as receptionists. Currently, they are working to create a student loan fund for use by young people in the community who go into

schools representing the professions that, combined, make the hospital team.

Miss Zindell urged other communities to consider the financing of the medical education of qualified local youths as a means of assuring a supply of doctors for their areas.

Community Shows Way To Get Physician

Huddleston is a Blue Ridge mountain town in Bedford County, Va. Its population of about 250 is hardly enough to cause a physician to give it consideration as a place to practice.

But the people of Huddleston were of the opinion that they needed a physician, and they were determined to get one. Six months ago, they did. Now, they have a clinic which they helped erect and where a young physician serves from 250 to 300 patients a week. These patients come from a widespread area.

The story of community enterprise which changed the medical care picture of the small town and its surrounding country was told by Earl J. Shiflet, Richmond, Va., State deputy of the Virginia State Grange.

The story is this:

In the spring of 1951, the newly organized Otter Grange of Bedford County included in its community program plans for obtaining a physician.

Organizational Help

A request was made of the Bedford County Medical Society to ascertain whether there was need for a physician in Huddleston. Within 10 days, the society reported there was a need and expressed the opinion that a physician could develop a good practice.

The Virginia Council on Health and Medical Care gave the community a list of physicians seeking a place to practice, and Huddleston was placed on the council's list as desiring a physician. Among those

contacted was a 29-year-old 1951 graduate of the Medical College of Virginia, who interned in the Norfolk General Hospital, and was seeking his first location.

The Otter Grange, in its planning, was joined by the Parent-Teacher Association and by other groups in the community. The young physician visited Huddleston and showed an interest. The community offered to make certain provisions in order that he might be able to start his practice without too great a financial burden upon himself.

Build Clinic

A trust company was formed to represent the community in an agreement with the physician. It was decided that the physician should have a clinic in which to practice and a desirable place in which to live. The physician was consulted on the type of clinic, and it was agreed to build a cinder block building consisting of a reception room, an X-ray room, doctor's office, examining room, and a laboratory. It was to be rent free the first year, after which \$500 a year was to be paid. The physician was to receive first option on the purchase of the clinic within 10 years.

An old, used school building near the clinic was converted into a comfortable and attractive residence for the doctor and his family at a \$70 monthly rental.

Mr. Shiflet paid tribute to the physician, saying:

"This was his first practice. He was setting up practice in a strange community. He was strictly on his own in a new kind of medical experience, with no one to fall back upon for advice. He had a family to provide for.

"First, and most important, he started off by giving good medical service to his patients. Residents of the community will testify to this.

"He has followed a strenuous schedule, sparing nothing to meet the medical needs of his people. He has purchased good equipment to in-

sure good medical attention. He has endeavored to make the clinic comfortable and attractive.

"Patients coming to the clinic are received by a charming receptionist. To complete the staff, the doctor has employed a trained nurse to work with those receiving medical attention. To make everything as convenient for the patient as possible, an X-ray machine has been installed and drugs are available at the clinic."

Small Town Practice Chosen Over Big City

Seven years ago, a 32-year-old physician in the Army Medical Corps figuratively tossed a coin. Should he, after being discharged from service, enter into general practice in a small town in the Ozark Mountains, or should he undertake further study to become a psychiatrist in a big city?

The Ozarks won. Today, Mountain Home, Ark., has a family physician who is happy in his surroundings although the road traveled was a rough one. This story was told by B. N. Saltzman, M. D., of Mountain Home, Ark.

A 1940 graduate of the University of Oregon Medical School, Portland, Dr. Saltzman, like many other young physicians, entered the Army after his internship. By 1946, he had accumulated sufficient discharge points to consider leaving the armed services. He was stationed in the Canal Zone at the time.

He heard that the town of Mountain Home, with a population of about 2,000 and located in the north central part of Arkansas, needed a physician and that the residents were willing to go to great lengths to make things suitable for a good medical practice.

Facilities Offered

There was no hospital, but he was informed that a modern office would be provided and equipped. A home would be made available to him

and his family, and there would be a new car.

"I would, of course, have to pay for these things later, but all I had to do now was to start practicing," Dr. Saltzman said.

He went to Mountain Home, where he found there was no modern office available and no equipment; there was no home available in the town, and his query as to a new car was met with expressions of "great glee and wonderment."

But another physician in the town, who was retiring because of ill health, turned his small office over to Dr. Saltzman and acted as his sponsor. Dr. Saltzman's savings went for the purchase of a small house still under construction; his old car had to do for another year. Sleeping quarters were established in the back of the office. After 4 months, he was reunited with his family.

There was no lack of patients, however, Dr. Saltzman said. The difficulty was in finding time to care for them. "My obstetrical practice flourished, and soon I was delivering as many as four babies a day in the homes."

Home vs. Office

Dr. Saltzman stated that he had to overcome the prevailing idea that the doctor should come to the home rather than that the patient should come to the doctor's office. Eighty percent of the house calls were useless and costly to the patient because of time and distances involved, he added. After modernizing his office and installing a laboratory, he began to educate his patients to come to him. Soon thereafter, Dr. Saltzman stated, his practice grew so rapidly that help was needed. He acquired an associate.

Then, the need for a hospital became more and more apparent. However, the building of it was left to the doctor. A hospital was completed 3½ years ago. It has 12 small private rooms for patients. Home deliveries are now a thing of the past; house calls have been cut to a minimum. Dr. Saltzman and his

associates are seeing more people than formerly, although their work has been cut in half.

The University of Arkansas Medical School has selected him as a preceptor—a teacher of young physicians who are given first hand experience in the problems and rewards of general practice in rural communities.

Dr. Saltzman gave suggestions for communities which are in need of a doctor: let the doctor be invited by organized action of community leaders willing to back up their promises—don't needlessly work the doctor to death; he's human; provide a small community-owned hospital, open to all reputable physicians in the area.

Helicopter Suggested To Transport Patients

The helicopter as a possible means of transporting patients from sparsely settled rural regions to hospitals where every facility is available was suggested by Louis H. Bauer, M. D., Hempstead, N. Y., president of the American Medical Association.

"In Korea," Dr. Bauer said, "patients are transferred by helicopters from the front lines in a very short time to hospitals where every facility is available. This is something to be considered by certain rural areas."

Dr. Bauer said that the Council on Rural Health is filling a long-felt want in acting as a liaison with other organizations to improve rural health conditions.

"Now all groups are cooperating in an effort to bring the highest standards of medical care to these areas," he said. "No one organization can do the job by itself. It requires a community effort."

Attracting Physicians

"One of the difficulties in the past has been the developing of some means to attract physicians to those regions lacking them. A physician

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who has spent 8 to 13 years of his life in being trained to practice modern medicine is not willing to settle in an area where there are no facilities for practicing such a type of medicine. Increasing the number of physicians will not do it, as they would still tend to congregate in cities.

"In some States, the problem has been solved by the community providing medical facilities and then permitting the physician to rent those facilities or to buy them through gradual amortization. Where this has been done, physicians have been obtained."

He also pointed out that in these days of good roads and automobiles a physician can cover a wider territory than before and is able to take care of more people.

"Every community does not need a hospital so long as one is available within a reasonable distance and good roads lead to it," he added.

More GP's Needed

Dr. Bauer expressed the opinion that medical schools should train more general practitioners, and that general practice should be a prerequisite for specialization. The AMA House of Delegates, he said, has directed that a committee be appointed to study this matter.

"Our voluntary insurance plans must be made available to rural people," Dr. Bauer stated. "Public health facilities must be extended to cover all areas so that there will be universal protection against communicable disease; protection of food, milk, and water supplies; elimination of disease-bearing insects, and adequate environmental sanitation."

Auxiliary Interested

Mrs. Ralph Eusden, Long Beach, Calif., president of the Women's Auxiliary to the American Medical Association, reported that the auxiliary membership, composed of 60,000

physician's wives, is actively engaged in the promotion of rural, industrial, and school health; prepayment medical care plans; health education; civil defense; and promoting good legislation.

Joint Action Cited

At a meeting of State medical committees on rural health held on the day preceding the annual conference, Walter B. Martin, M.D., Norfolk, Va., a member of the American Medical Association's board of trustees, said that the cooperation being shown by physicians and representatives of the people they serve is a splendid example of how a democratic people accomplish their objectives. "The problems of rural health are being worked out not by compelling laws, but by joint action of physicians, the public health services, and the people of the community," Dr. Martin stated.

Medical Care Insurance Seen as a Responsibility

Medical care insurance is missing from many family budgets because some individuals fail to assume full responsibility for their own family health and welfare, declared Frank W. Peck, Chicago, managing director of the Farm Foundation.

A person who neglects to plan his affairs to meet unforeseen contingencies has himself alone to blame, according to Mr. Peck.

He excepted the indigent, the aged, and persons otherwise unable to provide for themselves. Government has a role in helping these people, he said. However, he added, there has developed a growing opinion during the last quarter of a century that "preparing for the proverbial rainy day is old fashioned."

Medical care provisions are missing from many budgets, Mr. Peck pointed out, because a family may have had little experience with seri-

ous illness; their income is already being "stretched to the limit," because, in some instances, of the lack of understanding between "needs" and "wants," or they may have a tendency to "cross the bridge when they come to it."

He placed farm families with respect to attitudes toward budgets into four groups: those who budget and who may or may not include expenses for medical and dental care; those who dislike budgets because they find difficulty in keeping within them, or because of the self-discipline involved; those who are "getting along all right" and are willing to let "well enough alone"; and those who believe they will be taken care of, and look to the community or government to do it.

Education Needed

Mr. Peck offered "education" as the solution, stating: "This education includes appeal to logic and reason. It represents the teaching of values and benefits. It represents facing the economic facts of life, particularly in a business that has extraordinary risks and uncertainties. It belongs in the extension system of adult education."

Reporting on the activities of his organization, he said: "The Farm Foundation directs its educational effort to a better understanding of all plans and processes. It holds that only as rural people and medical men study and plan together will rural health programs be developed which will result in rural people raising their health standards while preserving those freedoms that are cherished by both farmers and medical men."

"In a situation so complex, difficult and dynamic as that of rural health in the United States, satisfactory solutions to all the problems involved are not to be found quickly. These problems have been developing for generations. Their solutions will require time, thought, effort, skill, cooperation, understanding, good will and patience."

County Health Councils And Public Health

PHR
brief

Recognition of the essential dignity of each individual has been my guiding principle both in the private practice of medicine, in which for years I earned my living, and in public health practice, my present activity.

I should think that this basic principle would dictate the decisions of other private or public health practitioners. In fact the more difficult the decision the more we ponder about what will best befit the dignity of the individual. This is a theme worth keeping as we go forward in bringing better health to this Nation.

Without question the interest of rural groups will help bring better health not only through securing physicians for rural areas, but also through greater emphasis on preventive medicine and public health. It is also true that the presence of a local health department helps attract private physicians to rural areas. They realize that private practice has lost nothing and gained much through sound local health department services.

Physicians have limits of physical endurance. They do their best work only after families are well informed and when the families carry out their obligations by maintaining personal hygiene, environmental sanitation, proper nutrition, immunization, and by consulting the physician early rather than after complications have arisen.

Traditional functions of a local health department are vital statistics, control and prevention of communicable diseases, environmental sanitation, laboratory services, protection of maternal and child health, and health education. Another field now coming into the scope of public health was described by Dr. Thomas P. Murdock, AMA trustee from Con-

necticut, in an address to the Association of State and Territorial Health Officers last December. He said, "The field now covers many of the long duration illnesses such as rheumatic fever, chronic arthritis, cancer, crippled children, syphilis, care of the blind, and diabetes."

The Common Meeting Ground

Daily, in outpatient departments and wards of hospitals, physicians see patients in whom the neglect of health has produced minor problems of disease and patients in whom the neglect of disease has produced major problems of illness. By taking an interest in these minor illnesses at a time when the patient is ready to listen to advice, the physician has a golden opportunity for the practice of preventive medicine. We, in public health, probably need to close the gap between the level of health education and recent improvements in the training and tools with which physicians work. Patient education is an important part of public health education because sick persons are concerned primarily about their own health, and to be concerned is the first step in learning. Patients want to know what happened to them, why it occurred, and to what extent they are responsible for their illness. The best education is still transmitted from one person to another in a heart-to-heart talk.

The health council actually is a projection of the concept of preventive medicine from the State level down to the community. That is where the laity, physicians, and the public health team find a common meeting ground to begin the solution of their community health problems. These problems change with time. We all know that a different pattern exists now from the one of the early-day health officer, who was thought to be mostly occupied with tacking up varicolored signs appropriate for each communicable disease.

The Community Health Council can approach disease prevention through fact finding and interpretation of needs, resources, and problems. It can formulate standards and promote their acceptance. The council can mobilize the forces and interests in the community for sup-

By Franklin D. Yoder, M.D., M.P.H., director of the Wyoming State Department of Public Health, Cheyenne.

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port, extension, and improvement of necessary services and facilities. It can help integrate related services, eliminate duplication of services and those for which there is no longer a need, and modify established services in keeping with new knowledge and changing community needs. Through central planning, informational, and referral service, the council can help promote full coordination and cooperation.

The importance of the participation of practicing physicians in community health council work cannot be overemphasized. Participation keeps physicians in touch with community health problems and enables them to give intelligent guidance to their solution.

In Wyoming we find several factors which produce interest in organizing a health council. In communities that want a public health nurse, a health council can help explain the benefits of this type of service to the people. Other communities may want to obtain a physician, they may want to take community action in eliminating a stream pollution or air pollution nuisance, or they may find it advisable to work toward building a hospital through the Hill-Burton program. Community health councils have been effective in these projects. Other conditions may help crystallize a health council in the communities of other States.

Put Into Practice

Health education is one of our broadest and brightest avenues to better health. An illustration of how health knowledge was put into practice by a western Nebraska family was given at last year's rural health conference.

The mother had suffered a broken arm, and the children, ages 6 to 14, had taken over. They planned the meals, taking into consideration the basic food elements and good sanitation. They policed the medicine cabinet for dangerous medicine, and they were justly proud of their new plumbing system and the disposal unit, safely located. Flies were under control and rodent control was so well in hand that even the cat couldn't find a mouse. The cows had been tuberculin tested (brucellosis wasn't mentioned), and the children were figuring how to

pasteurize the milk. They had studied the soil in relation to the trace minerals and the other elements and to human nutrition. The family had health insurance and were helping with the preparation of an office building for a physician who was coming to their community.

In health education, as in other respects, the community health council can help in the development of good health practices on the part of our rural residents.

The Place of the Physician In Rural Health Activities

PHR
brief
The physician's place in rural health activities is out in front. If physicians do not accept leadership in these activities—if they abdicate the role of guidance and direction which falls to them by training and responsibility—they forfeit not only a share of their influence, but also the right to criticize and judge the efforts of laymen who do interest themselves in this important field.

The rural health picture is not a single, simple one. It is a montage of many pictures, one that will vary from region to region, and from State to State. The whole environment of any given area—the climate, the soil characteristics, the stage of social and educational development, the types of landholding, and the level of transportation and communication—all these, and others, make up the facets of the greater picture.

The medical problem is not the only one in the rural health picture, and medicine alone—either in personnel or facilities—does not necessarily present the principal solution to these problems.

To illustrate, the doctors of the rural South, not so long ago, spent endless time treating

By Charles Reid Henry, M.D., chairman, rural health committee, Arkansas Medical Society, Little Rock.

pellagra. But when the whole health team—the laboratory nutritionist, the research chemist, teachers and leaders in information work, agricultural researchers, and the skilled field workers of the extension service—joined in the prevention of pellagra, it disappeared as a medical problem and as a health and economic factor. A great health program was overcome, not by bedside care—but by teamwork under medical leadership.

Of first importance in health activities, not only locally but at every level, is the attitude of the physician toward all the people and agencies available as allies in rural health efforts. The intelligent physician will let it be known that he welcomes all helpers in the field. He will not resent them as “busybodies,” or be contemptuous of the layman’s approach.

The typical physician—and the country doctor always—complains that he is terribly overworked, and can usually back up this complaint with facts and figures. But how often does he assess the whole situation around him which engenders his complaint? How well does he marshal others who might well lighten his load by helping to improve the circumstances—the larger health situation in which he works? Generally, the physician’s responsibilities in rural health activities are the same as those of any conscientious man interested in the welfare of his community, but the physician’s responsibilities extend further. In the smallest or unorganized communities, he may have to add to some degree the duties of sanitary engineer, epidemiologist, dairy and meat inspector, and quarantine officer. In larger communities, he will act as a watchdog to see that such functions are carried out faithfully.

Leadership Assignment

The mental curiosity and perception necessary to the successful completion of a medical education should naturally lead the physician to an awareness of health problems in his particular setting. He should further implement this awareness by sincere and eager cooperation with all the groups and agencies concerned with education, information, and community improvement. He should equip himself with a

knowledge of techniques used successfully in other areas to uncover and attack such problems.

In Arkansas we have proved at our rural health conferences that the Extension Service, the Home Demonstration Council, the Farm Bureau Federation, the dental association, the public school administrators, and the Woman’s Auxiliary of the Medical Society are all waiting for the go-sign from the local physician. They are all willing to do the legwork, paperwork, and the doorbell ringing necessary to gather facts on community needs. They are almost unanimous in assigning the physician number one place in planning and directing such activities. They will do the work, but they feel lost without his leadership and advice.

If the physician feels unequipped to exercise such leadership and to advise soundly, it is his duty to get the information necessary to initiate such activity, either from his State society rural health committee, from the American Medical Association, Council on Rural Health, or from libraries.

Planning and advising are not enough. No one can take the physician’s place to speak with authority on medical matters; he cannot assign decisions and interpretations on such matters to nonmedical personnel, no matter how willing.

The physician must assume his personal share of information and educational activities. These will involve, in most instances, talks before groups eager to get sound information on subjects affecting their health and medical needs. Careful preparation of talks will pay good dividends, both in effectiveness and in good will. Farm people of today, whether cattle producers, members of home demonstration units or Future Farmers of America, are accustomed to technical information such as they see regularly in extension bulletins, farm and health magazines, and their newspapers. A grunt and an anecdote are no substitute for a factual well-organized talk enthusiastically given.

The Broader Area

He must not overlook his influence in increasing attendance and participation at regional or State rural health conferences. Probably more

than anyone else in the community, he can draft leaders who will bring back from such meetings the enthusiasm and the stimulation so vital to the spread of interest in these activities. He is, in a measure, the adhesive agent which binds the various community forces together in health matters. I cannot emphasize too strongly the almost militant willingness to help if only the physician will lead the way. The cooperation is readymade and all that is needed is the spark of physician interest.

State medical society officials, and especially members of State rural health committees, must see that information about rural health problems is spread to every local society and to every physician. The problem is not just one for "country doctors"—it is the concern, or should be, of every doctor in the State. The specialist, who receives patients from rural areas, has just as big a stake in the whole picture as has the general practitioner. His attitudes, his efforts become a part of the whole feeling of the people in his State in their appraisal of medicine and medical care.

Of course, the first duty of a physician is to his individual patients but more than that, it is the responsibility of his profession to safeguard the whole health and medical care situation as well as professional knowledge can do it.

Dental Aspects of Rural Health in Oregon

EDITOR'S NOTE: Dean Noyes defined the major dimensions of rural dental problems and reviewed in some detail recent studies in Oregon. This "brief" excerpts from his paper a few of these significant findings and viewpoints which, as the author noted, may be of assistance to other areas.



Dental rural health problems do not differ greatly in quality or type from those that are found in the urban areas, although there is some difference in the distribution of specific oral diseases in the country as compared with the larger

cities. Our greatest problem is presented by the relatively thin geographic distribution of people in rural areas, which makes it necessary to modify appraisement methods of rural dental health and the administration of treatment.

The techniques of recording the type or pathologic nature of dental disease among rural peoples are similar to that in the city, consisting of surveys using data collected by dentists, dental hygienists or trained lay persons; the records of dental practitioners; the clinical judgment of these practitioners.

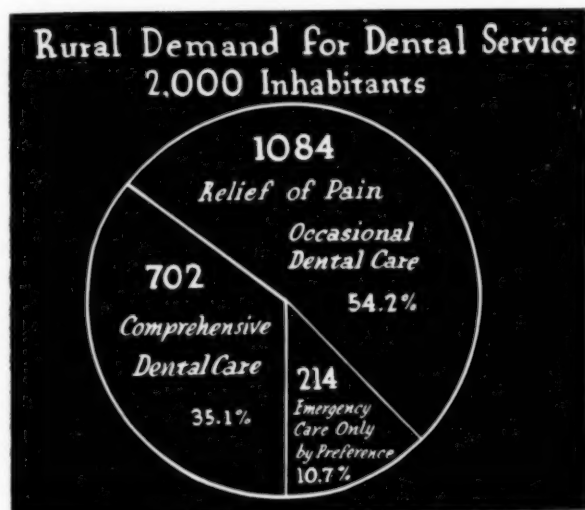
When we appraise our preventive measures, we find our armamentarium is comprised of the same therapeutic measures used with respect to those who reside in the city. These include education for adult and child; through education, the dietary control of oral disease of both the hard and soft tissues, and the promotion of good oral hygiene; through the topical application of sodium fluoride, particularly for young people, and the introduction of fluorine into the water supplies, with resulting benefits to children. In rural areas these benefits are limited rather largely to the school population and the extent to which an individual or household can take advantage of this proven preventive measure.

The advantage of fluorine in the water supply lies to a great extent in the early age at which it has effect. In other words, if we were limited to the topical application, even though we might be fortunate enough to make these applications to all the children of school age, fluorine in the home water supply provides the forming teeth of the child from birth to school age an advantage of even a greater degree of immunization.

I should like to mention, as well, the importance of early dental care. We may from time to time prevent serious problems if we take care of the little defects, and we can prevent serious and costly dental operations if we take care of the little things as the individual grows to attain maturity.

Now if we turn to the matter of treatment in rural areas, we find the same basic personnel as

By Harold J. Noyes, D.D.S., M.D., dean, University of Oregon Dental School.



in the cities except that here the personnel itself is spread over a wider area and the opportunity for choice of a dentist and the use of auxiliary personnel is far more limited. There are, of course, dentists who practice in small towns and the smaller metropolitan areas that are adjacent to farm and ranch country. In some cases, though far less than I would have expected, there is use of a dental trailer, which returns us to the itinerant dentists of the days of my grandfather, at which time it was not uncommon to have the dentist go around on horseback, or in a light wagon.

Dentists in metropolitan areas also have many rural patients, some of whom make it a business to come to the city periodically for dental care. Others combine dental attention with other business which they have in the city. This is difficult to arrange, particularly for young children, and it has other disadvantages. Auxiliary personnel—dental hygienists and dental assistants—likewise abound to a greater degree in the more heavily populated areas.

Rural Needs for Dental Care

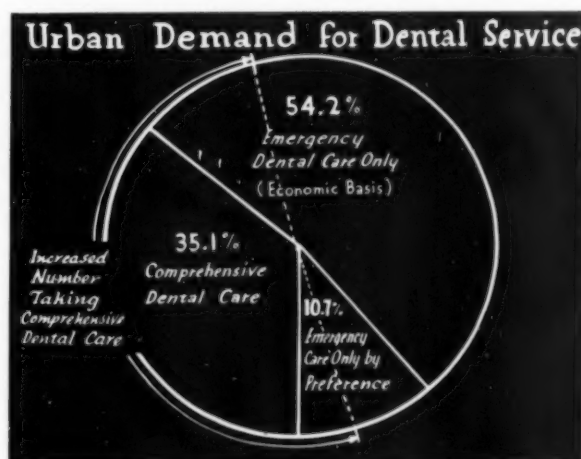
No clear line can be drawn between the rural and urban need for dental care. Nevertheless, people who live outside of corporate limits have a great handicap in access to dental personnel. Analysis of the dentist-to-population ratio in urban and rural counties of Oregon reveals a distinct difference.

Similarly, we must recognize the very real distinction between the needed amount of dental care and that demanded by a given community. Dental care must be considered in its proportional relation to general health, and the cost of complete dental care of the residents of Oregon would require the expenditure of approximately \$73,178,475 for the accumulated dental defects which exist at the present time. The annual cost of complete care for each year's increment of dental ills will approach if not exceed \$22,581,061. If there were dental personnel to provide these services, which there is not, the expenditure alone would be unwise if not impossible.

There exists a very real correlation between dental care purchased and the per capita income of the community. A similar relation, though less positive, exists between the educational level of a population and the willingness to procure dental services.

Effective Demand in Oregon

What, then is the effective demand in Oregon for dental care? The net income of 54.2 percent of the 61,188 farms in Oregon in 1945 is reported to be below \$1,500 annually. Persons who receive half of the necessities of life from their produce may be expected to purchase little more than emergency dental care. Of the remaining 45.8 percent no less than 10.7 percent will refuse all but emergency care, leaving but 35.1 percent who will have the means and in-



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clination to seek complete or nearly complete dental health service.

To deserve his consideration as a vocation among those open to young men and in order to make a livelihood which compensates him for educational expenditures a dentist must have approximately 700 patients that require his services for more than emergency care. Thus a dentist who is looking for a location in a rural community in the State of Oregon cannot consider any situation which does not offer approximately 2,000 inhabitants unless the average family income expectancy is above \$3,000 annually. Under average conditions he can postulate that 1,084 persons will not be able or willing to utilize his services for more than the relief of pain or occasional dental care; 916 will be able to do so, but of that number 214 will be unwilling to go beyond the extent of the first group; and he will have to rely upon the remaining 702 for his stable living (see "rural demand" chart).

In November 1952, there were 992 dentists licensed and practicing in Oregon, which has 1,521,341 persons (1950 census). This represents a ratio of one dentist to each 1,534 people. There are now 27 dental hygienists practicing in Oregon. A statement of this sort must be interpreted in terms of the availability of service to the individual who wishes dental care. In the urban area of Multnomah County, for example, the ratio is 1 to 935, while in Polk County it is 1 to 5,137, and in Sherman and Wheeler Counties, there are no dentists reported by the State Board of Dental Examiners.

Moreover, this does not mean that each person in Multnomah County has 1/935 care of one dentist. It means only that the persons who are willing to purchase dental service have attracted dentists to this area in that proportion. Why can a dentist find it to his advantage to serve in a 1/935 ratio in Multnomah County, when he cannot afford to risk location in most rural areas where he will be one dentist to 2,000 people? Because the segments of the circle are altered and the percentages changed in the urban area of Portland (see "Urban demand" chart).

The 35.1 percent who have the resources and

desire for dental care extend into the 10.7 percent that will not seek dental care. Moreover the 35.1 percent are sufficiently convinced of the value of this service that they will pay a higher premium for it. This means offering a greater bid for dentists than the same segment of rural population. Also, the 54.2 percent who feel that their circumstances justify only emergency care and limited service is transformed in part by dental health education and public social acceptances in such manner that they feel dental services deserve greater priority in their limited budget.

The Manpower Problem

Of the 992 practicing dentists in Oregon we can expect to lose 24 in 1953, if we accept the actuarial figure of O'Rourke (see chart). We may expect to lose, as well, 21 dentists who will leave Oregon to locate elsewhere. Anticipating that 75 percent of the Oregon residents whom we graduate in June of 1953 remain in the State of Oregon, we will increase our total by 35, and probably gain at least 5 Oregon graduates from out of State. We have the added opportunity for improving our ratio and compensating for such increase in population as may take place in the current year through the number of dental graduates from other dental schools who pass our State Board dental examinations and remain to practice in this State, estimated at 14. We could therefore expect to have 1,001 dentists in 1954, unless those taken by the Armed Forces are not replaced by veteran dentists who return to Oregon to practice.

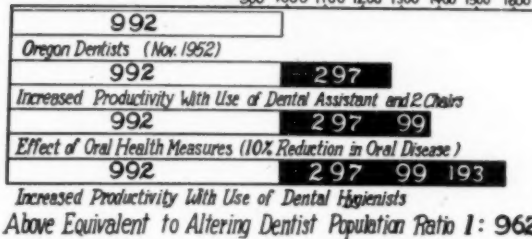
Amplifying Service

There are additional ways in which the available volume of dental service may be amplified. The use of auxiliary personnel—dental hygienists, assistants, technicians—effectively increase the productivity of the dentist. Related is the use of two-chair offices and modern equipment, and of late very interesting studies have pointed to the increased hours of service they permit.

The data are irrefutable with respect to our ability, if we would utilize our present knowledge, to reduce materially the incidence of dental disease in children. It is possible where the

Effect of Auxiliary Personnel Two Chairs and Dental Health Measures on Available Dental Care in Oregon.

DENTIST TO POPULATION RATIO 1-1534 (Nov 1952)



diet of a child can be controlled in an institution to practically prevent dental decay. Under present existing diets in the average home and with the almost insatiable desire which both children and adults have for sweets, this has not been practical in private homes. We should not, however, blame the dental profession for our inability to follow a dietary regimen which if implicitly pursued will make cavity formation negligible.

Likewise there is good reason to believe that the incidence of dental decay in children up to the age of 15 can be reduced approximately 40 percent by the topical application of sodium fluoride if the procedures advocated by the United States Public Health Service are pursued. However, the cost in the terms of a dentist's hours of time in applying sodium fluoride in his own office is about equivalent to that which would be required if he were to restore by fillings the cavities which he prevents. Here the use of a dental hygienist operating at a lesser hourly cost in the fabric of the public school system can perform a very important service.

We should not be misled, however, by thinking that a reduction in dental service required by children is a reduction in ultimate demand for care over the entire life span. While it is certainly important from the standpoint of esthetics and function and the effect which the latter has upon health, we must recognize that the retention of teeth may increase the problems which come from disease of their supporting tissues in the later years of life. We cannot,

therefore, look at preventive measures in childhood in any great degree as a reduction in the overall burden upon dental care.

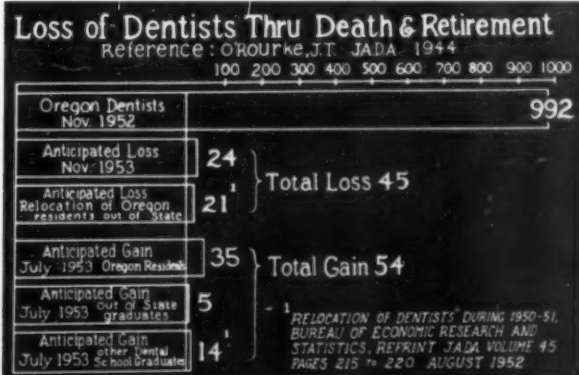
It is conservative to say that at least 10 percent of the need for dental care could be eliminated if the public would practice conscientiously and consistently the procedures which are presented in the literature and provided in the schools and follow the advice that is given in dental offices and in the programs which are promulgated by units of the dental profession and the State departments of public health.

To document this estimate: a 3-year dental health education program in Greenville, Tex., resulted in a rate of 9.9 missing permanent teeth per 100 children. In comparison, Jacksonville, Tex., where no dental health education was operating, there were 26.2 permanent teeth missing per 100 children.

If We Applied What We Know . . .

On the basis of national survey data, about half of the 992 Oregon dentists are now using two-chair offices, and about 64 percent employ dental assistants. The effect of full utilization of these resources would be to add 297 dentists to the total dental service rendered Oregon.

If we could develop effective measures in dental health education, it would relieve the burden on the dentists who are practicing in the State to an extent equivalent to adding 99 dentists to the overall total. Finally, if we were to save the operating time of 992 present practicing dentists by using dental hygienists



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for the limited operations they are licensed to practice, we would in effect add 193.

In other words, applying tested procedures would change the effective impact of 992 dentists to a condition equivalent to having 1,581 and would reduce the present dentist population ratio from 1 to 1,534 to 1 to 962 (see chart).

To Increase Rural Care

There are several practical ways to increase rural dental services in Oregon. First, encourage local residents to study dentistry. There is a tendency to return to the area of residence for professional practice. This should be fostered, as should the challenge that dentistry offers in the field of human service.

Second, support the State department of public health, whose dental health officer can facilitate dental health education, stimulate dental health service programs, and implement local district dental societies.

Third, support the State dental school. If we are to meet our obligations and assist in the provision of increasing dental care in the rural and urban areas alike, we must continue

our progress in increasing the number and the quality of dental school graduates. At the same time, it is essential that through the study of public health problems and energy directed in dental research that assistance be offered in the distribution of dental service and in the perfection of measures and technics which decrease the volume of dental ills.

Fourth, support local dentists. Earnest, conscientious professional men cannot exist nor can young men be encouraged to come to rural areas unless they can have the professional satisfaction of performing a comprehensive health service. They will be glad and willing, I am sure, to assist in the relief of pain, to perform extractions and emergency dental care and to construct full dentures, but if the rural areas are to compete with those of the larger cities in their bid for dentists it will be necessary to provide these men with the opportunity to administer dental service as a true health service and not on a basis of selling their wares over the counter upon the prescription of the patient, who is in no way qualified to make his own diagnosis or prescribe the expedient treatment.

Department of Health, Education, and Welfare Created

The Federal Security Agency became the U. S. Department of Health, Education, and Welfare on April 11, 1953. On the same day, Mrs. Oveta Culp Hobby was sworn in as the first Secretary of the newly created executive Department. Her nomination to the cabinet post was unanimously confirmed by the United States Senate on the previous day. Mrs. Hobby took office as Administrator of the Federal Security Agency on January 21, 1953.

As one of her first appointments, Mrs. Hobby named Park M. Banta of Arcadia, Mo., to the post of General Counsel. Mr. Banta replaces the former General Counsel of the Federal Security Agency, Mr. Alanson W. Willcox. After serving in the 80th Congress from the Eighth District of

Missouri, Mr. Banta practiced law in Ironton, Mo. Prior to his election to Congress, he served as administrator of the Missouri State Social Security Commission from 1941 to 1945.

Also, Mrs. Hobby has appointed Mrs. Jane Morrow Spaulding of Charleston, W. Va., as Assistant to the Secretary of the new Department. Mrs. Spaulding's wide experience in social welfare work includes service as State director of Negro relief for the West Virginia Relief Administration and the founding of the only private child-caring institution for Negro children in West Virginia. Mrs. Spaulding succeeds Mrs. Anna Arnold Hedge-man, a former assistant to the Federal Security Administrator.

Climate and Endemic Dental Fluorosis

By DONALD J. GALAGAN, D.D.S., M.P.H. and GLENN G. LAMSON, Jr., A.B.

INVESTIGATIONS demonstrating the relationship between trace amounts of fluoride in community water supplies, the prevalence of mottled enamel, and a reduction in dental caries experience have been extensive during the last half century. By 1931 it had been determined that mottled enamel was associated with the presence of fluoride in drinking water (1, 2). Subsequent studies revealed the direct quantitative relationship between fluoride and mottled enamel (3-6) and demonstrated the inverse relationship between fluoride and dental caries experience (7).

Based upon these data, using the community fluorosis index to measure the extent of mottled enamel (8), and the decayed, missing, filled (DMF) index as a measurement of caries experience (9), an optimum fluoride concentration was derived for use in the supplementation of fluoride-deficient community water supplies. The range of fluoride concentration most effective in preventing dental caries was established at approximately 1.0 to 1.5 ppm, well below the critical point in the causation of mottled enamel.

A review of the literature reveals that the recommended fluoride levels have been determined from observations made within a fairly limited geographic area, principally in the Midwest (10) where mean annual temperatures are approximately 50° F.

Temperatures in the continental United

States vary widely, from an average mean annual temperature of 40° to 45° F. in the northern tier of States to 70° F. and above in some areas of California, Arizona, Texas, Louisiana, and Florida (fig. 1).

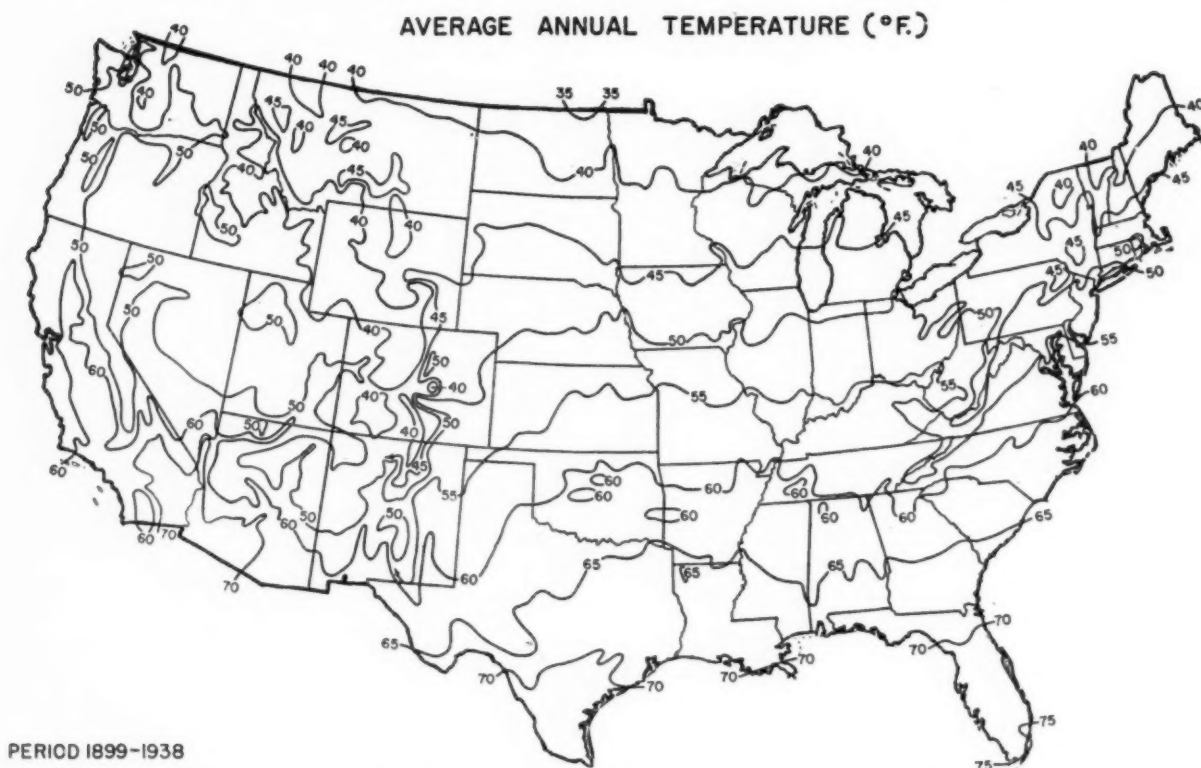
In view of the temperature distribution in the United States, a fluoride concentration of 1.0 to 1.5 ppm seems justifiable for the major portion of the country. However, Arnold (11) has suggested that because of climatic conditions 1.0 to 1.5 ppm of fluoride may not be practical or desirable in every community, and Dean has recently indicated that less than 1.0 ppm of fluoride may represent the optimal level for dental caries control in a southern community (12). The early findings of the Smiths (13, 14), while not relating mottled enamel to climatic factors, certainly suggest that mild fluorosis is associated with less than 1 ppm of fluoride in certain areas in Arizona.

Recognition of a probable relationship between fluoride concentration and climate is being observed in the present fluoridation effort. For example, in the State of Wisconsin, 1.3 ppm is recommended. In Charlotte, N. C., the concentration of fluoride is varied from a high of 1.2 ppm in winter to a low of 0.6 ppm in summer, and in Florida, 0.7 ppm is the recommended optimum amount. Nevertheless, if climatologic factors markedly influence the water intake of infants and youth, additional information about optimum concentrations should be obtained for those exceptional areas experiencing extreme climatic conditions.

Since the severity of mottled enamel has a specific relationship to the fluoride content of water consumed, the application of a simple biological test such as a measurement of fluorosis

Dr. Galagan is the regional dental consultant assigned by the Public Health Service to Region X, San Francisco, Calif. Mr. Lamson was formerly a health program representative assigned to that region.

Figure 1. Variations in temperature throughout the continental United States, 1899-1938.



SOURCE: U. S. Department of Agriculture, *Climates of the United States*, Yearbook Separate No. 1824, Washington, D. C., 1941.

may be used to evaluate water intake indirectly. In order to use this method of assessing climatic forces upon water intake, it seemed logical to measure fluorosis in communities with extreme temperatures. If objectionable fluorosis was not associated with fluoride levels around 1.0 ppm in the areas with extremely high temperatures, then that concentration would be desirable in the supplementation of fluoride-deficient water in areas with similar climate, and at least that amount would be required in all other parts of the United States.

Field Studies

The Arizona communities of Yuma, Tempe, Tucson, Chandler, Casa Grande, and Florence were selected for initial study. With the exception of Yuma these communities lie south and east of Phoenix on the plains of the Arizona Desert. Yuma is situated on the Yuma Desert on the northern edge of the Great Desert of Sonora, Mexico.

These six communities met the necessary re-

quirements for investigation. They had water supplies with adequate continuity and with fluoride concentrations ranging around 1.0 ppm. They were of sufficient size to yield a sample of native-born children large enough to be significant (15). They had mean annual temperatures ranging from 67° to 72° F., with an average mean annual temperature of approximately 70° F. This area is consistently reported as one of the hottest inhabited areas in the United States, exceeded in temperatures only by certain communities adjacent to Death Valley, Calif.

Public Water Supplies

The general characteristics of the water systems of the six study communities are shown in table 1. The data on fluoride determinations of the common water supplies of the six communities are presented in table 2.

These data were available as samples taken from individual wells and from the general distribution system after pooling. The arithmeti-

Table 1. Characteristics of the common water supplies in six Arizona communities, 1935-51

Community	Source of supply	Treatment
Yuma.....	Colorado River.	Desilting; aluminum sulfate; flocculation; copper sulfate; filtration; chlorination.
Tempe.....	4 wells.....	Chlorination.
Tucson.....	17 wells.....	Chlorination; ammoniation.
Chandler.....	4 wells.....	None.
Casa Grande.....	5 wells.....	Do.
Florence.....	4 wells.....	Do.

cal mean of all available analyses of individual well water and of finished water has been accepted as the figure most nearly representing the fluoride concentration of the several water supplies. They represent analyses made intermittently from 1935 through 1950 and quarterly during 1951. The fluoride concentrations range from 0.4 ppm at Yuma to 1.2 ppm at Florence.

A more detailed description of each of the water supplies follows.

Yuma. The public water supply of Yuma has been obtained from the Colorado River since 1892. The treatment plant in current use was put into operation in 1945. The first treatment starts about 18 miles above Yuma, where a desilting plant is located. The main treatment plant is situated on the Arizona bank of the Colorado River in Yuma proper. A 4,500-gallons-per-minute turbine pumps water directly into the first settling basin in the plant. A second turbine, with a 5,000-gallons-per-minute capacity, pumps water from the Bureau of Reclamation canal, 1,200 feet away. Treatment at the plant consists of the addition of aluminum and copper sulfate, flocculation, filtration, and chlorination. Storage is obtained by means of two 500,000-gallon reservoirs from which the water is pumped into the distribution system.

(In the summer of 1937, sewage backed up in the Colorado River, and the water became unsafe for drinking purposes. During a 3-month period water from the City Park well, normally used to supply the municipal swimming pool, was pumped into the distribution system and supplied the water for the community. No data are available indicating the fluoride concentration of the well water at the time it was used for drinking purposes, but a

sample of the water as of May 12, 1951 showed 0.6 ppm.

The mean of 79 fluoride determinations shows the Yuma water supply to have a fluoride concentration of 0.4 ppm.

Tempe. During the study period the water for the community of Tempe was obtained from four wells. These wells, established in 1894, were located side by side, were pumped by a single piston, and were approximately 140 feet deep. No data are available to show whether they were cased, but the local waterworks operator thought they probably were not.

Finished water is stored in a 1,000,000-gallon tank. Chlorination was instituted in 1939; no other treatment is given. The average fluoride concentration for the common water supply is 0.5 ppm.

Tucson. The city of Tucson presented a special investigative problem. The water supply for the community is derived from more than one source, and is distributed through two systems, the Northside system with a fluoride concentration of about 0.3 ppm. and the Southside system with a fluoride concentration of 0.7 ppm. This study was concerned exclusively with the area served by the Southside system and hereafter will be the one under consideration.

The water for the Southside system is obtained from ground water in the Santa Cruz River basin. It is produced from 17 wells located south of the city on the east bank of the river (dry). The water from these wells is pumped into a 30-inch concrete conduit which carries it to two reservoirs, with

Table 2. Reported fluoride concentration of water from all available single source and distribution system samples in six Arizona communities, 1935-51

Community	Number of samples	Mean fluoride content
Yuma.....	79	0.4
Tempe.....	7	.5
Tucson.....	31	.7
Chandler.....	16	.8
Casa Grande.....	20	1.0
Florence.....	22	1.2

SOURCES: University of Arizona, College of Agriculture, Agricultural Experiment Station, Tucson, Ariz.; U. S. Department of Agriculture, Bureau of Plant Industry, Soils and Agricultural Engineering, Salinity Laboratory, Riverside, Calif.

1,500,000- and 7,300,000-gallon capacities, respectively. The water is chlorinated at a point in the conduit before arriving at the reservoir. This is followed by ammoniation at 0.05 ppm.

Fourteen of the 17 wells were in operation prior to 1930. Two additional wells were placed in use in 1946, one in 1947. The wells are pumped alternately in the winter; in the summer, when demand is greater, all wells operate most of the time. The first 6 wells sunk are 125 feet deep. The remaining 11 extend from 200 to 300 feet in depth. Their individual output varies from 300 to 1,300 gallons per minute, with a total capacity of 9,000 gallons per minute.

Since 1938, when a set of control valves was installed to separate the two systems, no water has passed from the Northside into the Southside system. Prior to 1938, small amounts of water may have passed from the Northside into the Southside system. Since the fluoride concentration of the Northside system is the lesser of the two, the contamination of the water under investigation, if any, would result in a lowered fluoride concentration.

Only children who had continuous exposure to the common water supply of this community within a community were included in the study group. A buffer zone of three to five blocks was set up within the limits of the Southside system. Children were excluded from the study if they had lived in or beyond the buffer zone at any time. The normal range of a child at play probably is not greater than that; consequently, exposure to fluoride concentrations less than that of the Southside system would be casual.

The broken line on the map of the city of Tucson (fig. 2) shows the limits of the Southside water system as of 1935. The solid line indicates the area from which the study children were selected.

Chandler. During the study period the water supply for the city of Chandler has been produced by four wells. The initial two wells, 335 and 987 feet deep, were drilled and put into operation in December 1926. Both wells drew water from the 300- to 325-foot level, the depth at which they were perforated. In 1938 the casing above the perforations broke, and a considerably harder water began to enter the wells. Because of this, two new wells were put into operation, one in 1944 and one in 1948. They are both 650 feet deep, perforated from the 360-foot level to the bottom. The original wells were sealed off in September 1944.

The arithmetical mean of the fluoride determinations made while the original wells were in use is 0.75 ppm; of those made subsequent to that date, 0.85 ppm. The single analysis available for the period during which water was entering the wells from above the perforations indicates that the fluoride concentration at that time was 0.8 ppm the same as the numerical average for all observations. It seems clear that the fluoride concentration of the common water supply has remained constant during the study period.

Casa Grande. The water for Casa Grande is obtained from five wells, which were put into operation in 1922, 1930, 1937, 1946, and 1950. The location of each new well site was moved consistently to the northeast to get better water, but they are in fairly close proximity, all but one being within the city limits. The wells range in depth from 210 to 302 feet, with the exception of one 759-foot well which is used for emergency purposes only. No data were available as to the depth of the perforations in the well casing.

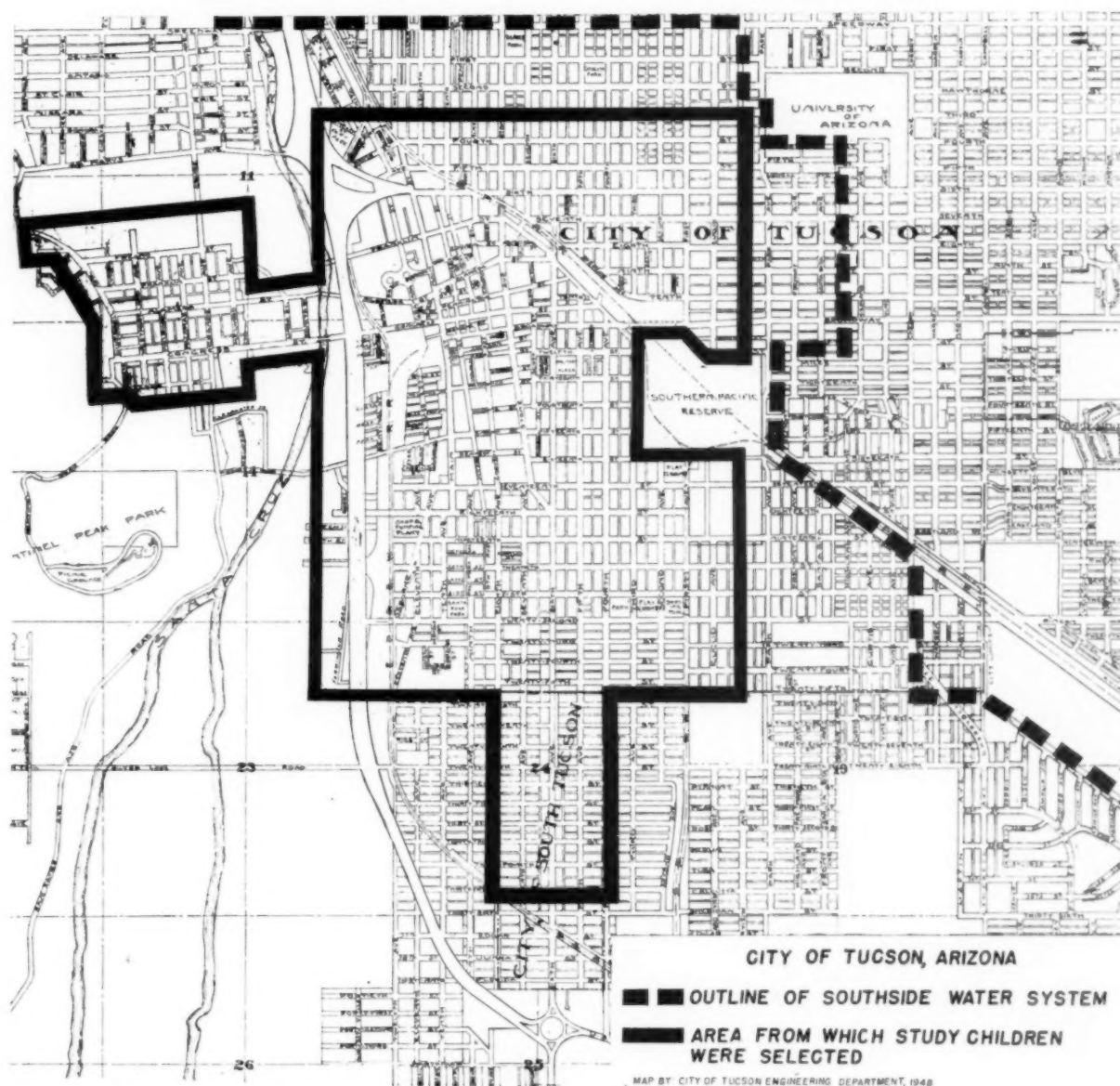
The wells have a total rated output of 1,700 gallons per minute with an average reported daily output of 594,000 gallons. The water is stored in a ground level storage tank of 500,000-gallon capacity and in an elevated tank holding 100,000 gallons. It is not treated.

The new wells added to the system during the present study do not seem to have changed the fluoride concentration of the water supply. Samples from the distribution system have ranged from 0.9 ppm to 1.2 ppm of fluoride. Twenty analyses, for the years 1931 through 1951, are available, representing all seasons of the year. The numerical average of all available fluoride concentrations reported for samples taken from the system and from individual wells is 1.0 ppm.

Florence. During the study period the community of Florence has obtained its water from four wells. The two original wells, 180 and 190 feet deep, were put into operation in 1919. A new 400-foot well, perforated the last 40 feet, was put into operation in 1939, and the two old wells were closed. Because of increased demand, another 400-foot well, perforated at the same level, was put into operation in July 1947. The new and the original wells are adjacent to each other within the city limits.

The wells now in use have a rated output of 350 gallons per minute, and an average daily output of

Figure 2. Map of the city of Tucson, Ariz., showing outline of Southside water distribution system, buffer zone, and area from which study children were selected.



386.5 thousand gallons per day. The water is not treated. Overflow is stored in a 55,000-gallon elevated standpipe.

Since there was a complete change in well usage during the early part of the study period, the available fluoride concentrations have again been divided into those taken prior to the date the old wells were closed, July 1939, and those taken after that date. A total of 21 fluoride analyses, with a numerical average of 1.2 ppm, was reported during the study period. Fourteen of the samples were taken prior to July 1939, and 7 were taken

after that date. Both average 1.2 ppm of fluoride. It seems evident that the fluoride content of the Florence water supply was not altered by the change in wells.

Materials and Methods

Since these studies were designed to determine the extent of dental fluorosis in children with continuous exposure to common water supplies containing low fluoride concentrations, it was necessary to get accurate information regarding the water history of the children

Table 3. Percentage age distribution of 726 children examined in six Arizona communities, 1951

Number of children in each community	Age (years) and percent in each age group							
	9	10	11	12	13	14	15	16
Yuma (82)-----	5	9	7	10	7	18	16	28
Tempe (113)-----	5	13	16	18	11	12	13	12
Tucson (316)-----	3	7	8	11	18	24	17	12
Chandler (95)-----	8	15	14	20	15	9	12	7
Casa Grande (50)-----	8	12	22	12	18	14	8	6
Florence (70)-----	3	9	9	16	18	14	20	11

studied. The following screening procedure was adopted in each community:

Screening Step 1. Public and parochial school children from the fourth through the ninth grades were each issued a card which asked the following questions:

Were you born in this town?

Have you lived here all your life?

Have you been away from this town for more than 30 days in any 1 year?

This initial screening served to eliminate those children obviously not continuous residents of the community.

Screening Step 2. Each child who indicated that he was born in the community and had lived there all his life was given a questionnaire to take home to his parents or guardian, with an explanatory letter. The parents were requested to record the birthplace of the child, the addresses of all his residences, continuously and in sequence, from birthdate to date of the questionnaire, and the source of the water used for drinking and cooking purposes at each residence. They were also asked to describe specifically the absences of the child from the community for more than 30 days.

Screening Step 3. Children who passed through the first two steps were scheduled for dental examination. At the time of examination, each child was questioned by a dentist or a dental hygienist to verify the information obtained in steps 1 and 2. A school or public health nurse was present to add her knowledge of the home situation to the water history data.

Screening Step 4. If the data obtained in any of the first three steps was inconsistent the parent

was interviewed by a member of the survey team and was asked to clarify the discrepancies.

Only children who had consumed water from the common municipal supply continuously from birth through their ninth year were included in the study. Children who experienced interruption in the continuity of consumption of the community water for periods of more than 30 days in any one calendar year were excluded. The remaining children served as study material.

Clinical Examinations

All dental examinations were made by the same examiner. The children were seated in a portable dental chair; and a mouth mirror, a Burton light, and compressed air were available for the examiner's use. Each tooth was assigned a fluorosis classification according to Dean (8). The tooth-unit fluorosis classification was later transposed into child-unit classification for use in computing the community fluorosis index. The percentage age distribution of the 726 Arizona children examined is shown in table 3.

Findings

The data relative to the prevalence and severity of fluorosis obtained in the six communities are presented in table 4. The occasional child falling into the moderate or severe classification when exposed to relatively low fluoride concentrations is worthy of note.

The community fluorosis index may be used for an objective measurement of the extent of endemic dental fluorosis. The direct relationship between fluoride concentration and fluorosis noted in prior investigations is evident. As the fluoride concentration rises the community fluorosis index is increased and the number of children without visible fluorosis is reduced. The community fluorosis index ranges from 0.21, associated with 0.4 ppm of fluoride at Yuma, to 1.12 for Florence which has 1.2 ppm of fluoride in its water supply.

Comparison With Midwestern Indexes

To compare possible variations in the intensity of dental fluorosis under different climatological conditions, data obtained from 10 com-

Table 4. Prevalence of fluorosis, distribution of signs of fluorosis and community fluorosis indexes in relation to fluoride concentrations of common water supplies continuously used by 726 children examined in six Arizona communities, 1951

Community	Fluoride concentration	Number children examined	Number children affected	Number of examined children with signs of fluorosis						Community fluorosis index
				Fluorosis absent		Fluorosis present				
				Normal	Questionable	Very mild	Mild	Moderate	Severe	
Yuma.....	0.4	82	3	53	26	2	1	-----	-----	0.21
Tempe.....	.5	113	11	59	43	10	1	-----	-----	.30
Tucson.....	.7	316	53	120	143	38	10	5	-----	.46
Chandler.....	.8	95	18	40	37	9	6	2	1	.52
Casa Grande.....	1.0	50	24	7	19	15	9	-----	-----	.85
Florence.....	1.2	70	39	17	14	18	10	9	2	1.12

munities with similar fluoride concentrations were selected from the study of "21 cities" by Dean and his co-workers (10). The communities in the 21 cities group, which may be considered as a base line, have a mean annual temperature of approximately 50° F., whereas the six communities in Arizona have a mean annual temperature of approximately 70° F.

Data on the prevalence and severity of fluorosis in both groups of communities are presented in table 5.

Comparison of the data reveals that the Arizona communities have a somewhat higher percentage of children affected by fluorosis than communities with a cooler climate and comparable fluoride concentrations in their water supplies. There is also a wider distribution throughout the fluorosis classification. Some of the Arizona children present moderate to severe fluorosis associated with exposure to less than the generally recommended fluoride concentration of 1.0 ppm.

Dean has stated that a community fluorosis index below 0.4 is of little or no public health concern. He considers the range from 0.4 to 0.6 as borderline. For indexes above 0.6 the removal of excessive fluorides from the water is recommended (8). From table 5 it may be seen that the fluorosis indexes for communities with fluoride concentrations above 0.5 ppm are considerably higher in the Arizona communities. Yuma, Ariz., and Marion, Ohio, both have fluoride concentrations of 0.4 ppm and fluorosis indexes of 0.21 and 0.25, respectively.

As the fluoride concentration rises, the disparity between indexes becomes marked, so that Florence, Ariz., and East Moline, Ill., with fluoride concentrations of 1.2 ppm, present fluorosis indexes of 1.12 and 0.49, respectively.

The fluorosis indexes for the two groups of communities have been plotted on figure 3.

The least squares method was used to calculate the index lines. (Trend line formula for 70° F. communities is $y = -0.291 + 1.132x$ and for 50° F. communities is $y = 0.021 + 0.353x$.) The line for the Arizona group has a much steeper slope than that representing the midwestern communities. The index line for the Arizona communities accelerates at approximately twice the rate as the one for the midwestern communities. The line for the midwestern cities crosses from the negative area into the borderline zone at approximately 1.1 ppm and from the borderline into the objectionable zone at 1.7 ppm. On the other hand, the line for the Arizona communities crosses from the negative area into the borderline zone at 0.6 ppm and into the objectionable zone at 0.8 ppm.

These data would indicate that the children residing in the Arizona communities under consideration develop twice as much fluorosis as midwestern children when exposed to water containing the same concentration of fluoride. (It should be noted that the two groups of children were diagnosed by different examiners. The data are therefore subject to the error of examiner differences.)

Climatological Variables

About two-thirds of man's total fluid intake is water, the remainder, other fluid substances. Except for temporary circumstances of an emotional nature, the amount of fluid ingested is determined by water deficiency. Every bit of body water lost must be replaced, and the replacement amounts are obligatory. (In growing children fluid intake may be slightly greater than water loss since some additional water is needed to build new tissues, but generally speaking, water intake and water loss will be equal over a 24-hour period.)

Temperature

Excessive temperatures result in a bodily demand for fluid over and above that usually

required for normal physiological processes (16). When environmental temperatures rise above skin temperature (92° to 95° F.), the only method by which the body can cool itself is vaporization. Heat loss can no longer be effected by radiation or conduction. The water output of the body is therefore increased in proportion to the need for increased vaporization. It follows that there will be an equal increase in the amount of water ingested in order to maintain body water balance.

The extremely high temperature occurring in the southwestern communities is undoubtedly a major factor contributing to the increased severity of endemic fluorosis observed in the Arizona children through its influence on water consumption. Some indication of the differ-

Table 5. Prevalence of fluorosis, percentage distribution of signs of fluorosis and community fluorosis indexes in relation to fluoride concentration of common water supplies of 16 communities in two temperature zones

Community	Fluoride concentration	Community fluorosis index	Number children examined	Percent children affected	Percentage distribution of signs of fluorosis						Mean annual temperature ° F. ¹
					Absent		Present				
					Normal	Questionable	Very mild	Mild	Moderate	Severe	
<i>Arizona</i>											
Yuma	0.4	0.21	82	4	65	32	2	1			72.2
Tempe	.5	.30	113	10	52	38	9	1			68.6
Tucson	.7	.46	316	17	38	45	12	3	2		67.4
Chandler	.8	.52	95	19	42	39	9	6	2	1	67.6
Case Grande	1.0	.85	50	48	14	38	30	18			71.0
Florence	1.2	1.12	70	56	24	20	26	14	13	3	69.3
<i>Midwest</i>											
Marion, Ohio	.4	.25	263	6	57	37	5	1			52.1
Elgin, Ill.	.5	.22	403	4	61	35	4	1			49.4
Pueblo, Colo.	.6	.17	614	7	72	21	6	(²)			52.6
Kewanee, Ill.	.9	.31	123	12	53	35	10	2			50.9
Aurora, Ill.	1.2	.32	633	15	53	32	14	1			49.4
East Moline, Ill.	1.2	.49	152	32	37	32	30	2			50.9
Maywood, Ill.	1.2	.51	171	33	39	28	29	4			50.1
Joliet, Ill.	1.3	.46	447	25	41	34	22	3			49.4
Elmhurst, Ill.	1.8	.67	170	40	28	32	30	9	1		50.1
Galesburg, Ill.	1.9	.69	273	48	25	27	40	6	1		50.9

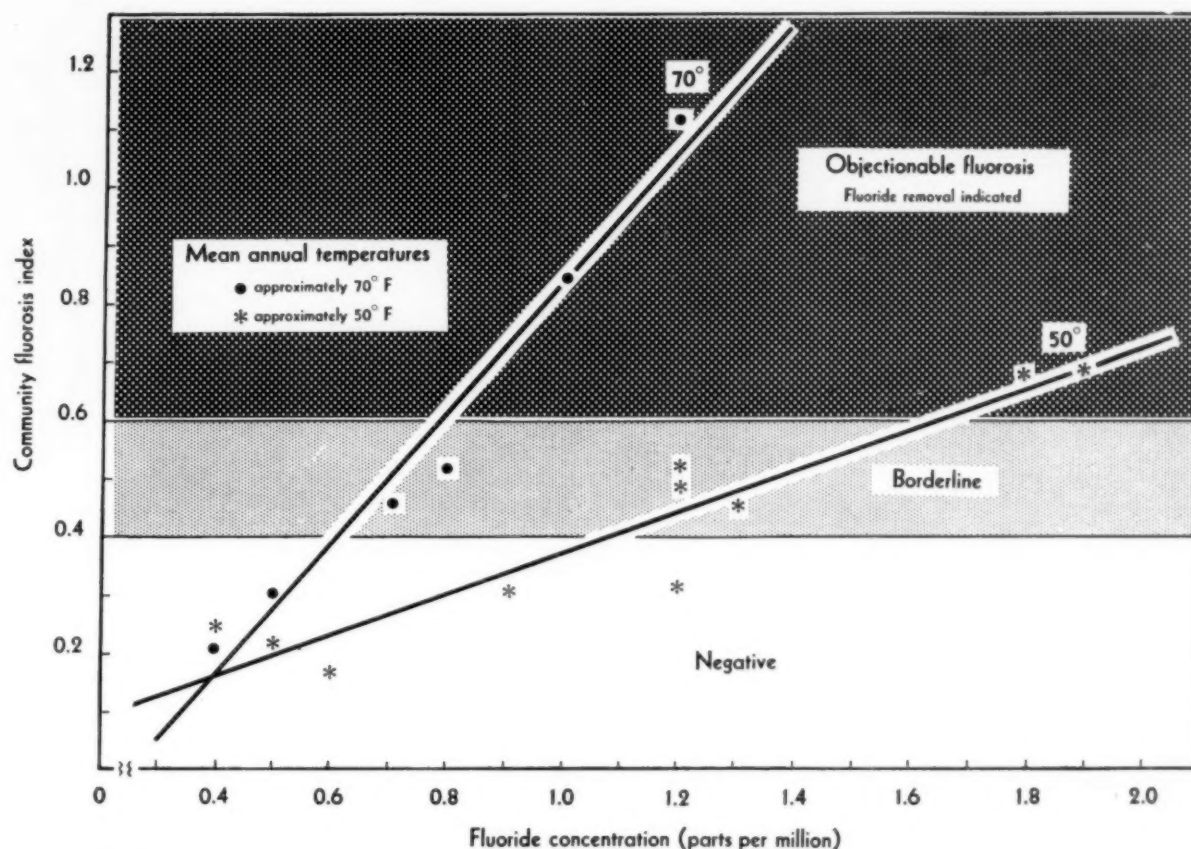
¹ Average: Arizona, 69.3° F.; Middle West, 50.6° F.

² Less than 0.5 percent.

NOTE: Age range for Arizona group, 9-16 years; midwestern group, 12-14 years.

SOURCES: Fluorosis data for midwestern communities from Dean, H. T.: Epidemiological studies in the United States. American Association for the Advancement of Science: Dental caries and fluorine, Science Press, Lancaster, Pa., 1946; mean annual temperature for 6 Arizona communities from Smith, H. V.: The climate of Arizona. University of Arizona, Agricultural Experiment Station, Bulletin No. 197, July 1945; for midwestern communities; from U. S. Department of Commerce, Weather Bureau: Climatological data. Monthly and annual summaries: The mean annual temperature for Aurora, Joliet, and Elgin is represented by the 19-year average mean temperature for Aurora; that for Kewanee, East Moline, and Galesburg by the 19-year average mean temperature for Galva; and that for Maywood and Elmhurst by the 19-year average mean temperature for Chicago.

Figure 3. Relationship between fluoride concentration of municipal waters and fluorosis index for communities with mean annual temperatures of approximately 50° F. (Midwest) and 70° F. (Arizona).



Source: Table 5.

ence in temperature between the two geographic areas is reflected in their mean annual temperatures of 50° and 70° F. (table 6).

Temperature Range

The mean annual temperature is a simple measure of the climatic conditions to which man is exposed. It is the mean of the daily high and low temperatures for a year, and does not critically reflect differences in daytime and nighttime temperatures.

During most of their tooth-forming years children are active almost exclusively during daytime hours. Consideration of mean temperature alone may therefore result in an underestimation of the actual temperatures to which they have been exposed in warm, semi-arid climates. Comparisons of temperature ranges may reflect more clearly the real difference in temperature experienced by the chil-

dren residing in two geographic locations. The data on mean maximum and mean minimum temperatures and the temperature ranges for the Arizona communities under consideration, and for the midwestern communities (or representative communities if complete weather data for each city were not available) are also presented in table 6.

Although the difference between the mean annual temperatures of the two groups of communities is considerable, the difference in the range of high and low temperatures, or day and night temperatures, is even more marked. The midwestern communities have an average range of 22° F. between the daytime maximum and the nighttime minimum, whereas the Arizona communities have an average range of 33° F. Daily variations are considerably greater in any semi-arid area (17), and daytime temperatures well above 100° F. are common

Table 6. Annual mean maximum, mean minimum, mean temperature, and temperature range for six Arizona communities and five representative¹ midwest communities

Community (station)	Number of years of rec- ord	Temperature (° F.)			
		Mean maxi- mum	Mean mini- mum	Mean	Range
<i>Arizona</i>					
Yuma Citrus Sta- tion-----	20	87. 2	56. 9	72. 2	30. 3
Tempe No. 2-----	15	84. 3	53. 0	68. 6	31. 3
Tucson (Univer- sity of Arizona)-----	49	82. 5	51. 3	67. 4	31. 2
Chandler-----	21	85. 3	50. 3	67. 6	35. 0
Casa Grande-----	26	87. 8	51. 7	71. 0	36. 1
Florence-----	26	86. 3	52. 7	69. 3	33. 6
<i>Midwest</i>					
Marion, Ohio-----	19	62. 4	42. 3	52. 1	20. 1
Pueblo, Colo-----	19	67. 3	36. 8	52. 6	30. 5
Aurora, Ill-----	19	60. 5	39. 0	49. 4	21. 5
Chicago, Ill-----	19	58. 4	42. 7	50. 1	15. 8
Galva, Ill-----	19	62. 2	40. 6	50. 9	21. 6

¹ Aurora represents Aurora, Joliet, and Elgin; Chicago represents Maywood and Elmhurst; Galva represents Kewanee, East Moline, and Galesburg.

SOURCES: For Arizona communities: Smith, H. V.: The Climate of Arizona. University of Arizona, Agricultural Experiment Station, Bulletin No. 197, July 1945; for midwestern communities: U. S. Department of Commerce, Weather Bureau, Climatological data, monthly and annual summaries.

for many weeks in the Arizona communities. The interpretation of these data makes even more striking the difference in temperatures to which the children of the two zones are exposed.

Radiant Heat Gain

Water needs vary with other factors beside temperature. Body weight, physical activity, direct radiation, and humidity may all play a part in the amount of fluid lost by the body and therefore in the amount of fluid ingested to maintain water balance. Certain of these variables, such as body weight and physical activity, which contribute to physiological heat gain, will obviously not differ greatly between geographic areas. Other factors contributing to environmental heat gain should be taken into consideration, however.

Individuals exposed to the same air temperatures and different amounts of direct sun-

light are subject to varying influences on water loss. It has been demonstrated that there is an increase in the sweating rate of about 20 grams per hour for each degree of increase in air temperature. Direct sunlight causes an elevation in the sweating rate equivalent to that resulting from a 10°F. increase in air temperatures (18). Therefore, exposure to direct sunlight increases water loss by increasing radiant heat gain. An indication of this factor may be obtained from a determination of the amount of sunshine in an area.

The part of Arizona under consideration has a greater percentage of possible sunshine than any other area in the United States—80 to 85 percent compared to 50 to 60 percent in the Chicago area (17). Therefore in the southwest desert there is extremely high radiant heat gain from the sun. This climatic factor, causing a degree of environmental heat stress not reflected in temperature measurements alone, may also indirectly account for some of the observed regional differences in endemic fluorosis.

Relative Humidity

The effect of humidity upon water loss is not as clear as that of temperature and radiation. Studies by Adolph (18), Rubner (19), and Benedict and Carpenter (20) suggest that a lower relative humidity tends to increase water loss, temperatures being equal. On the other hand, Newburgh (21) points out that since moisture demand is decreased in humid air, more skin surface has to be wetted (and more sweat produced) to achieve the equivalent of cooling experienced in dry, absorbent air of comparable temperature. Therefore, a humid atmosphere would tend to increase water loss merely by making the body secrete more sweat in order to gain the same amount of evaporative cooling accomplished in arid areas with less water loss. Since the data appear to be conflicting, the influence of relative humidity upon the water intake of infants and children is difficult to assess.

Considerable difference does exist between the relative humidities of the two areas in the study. For example, the annual mean relative humidity for the Tucson-Yuma area is 35 to 37 percent, and for the Chicago area, 74 percent (17). The data available indicate that

the Arizona communities have relative humidities approximately half that observed in the midwestern communities. On hot summer afternoons the relative humidity in the Arizona desert may be 5 percent or less.

It is questionable whether the marked difference in relative humidity between the two areas is influential in the water intake of infants and children. Measurement of its influence is further complicated by the difficulty encountered in obtaining comparable humidity data and by the fact that other meteorological conditions appear to have a greater effect on water loss.

Nonclimatic Variables

The Arizona area under consideration is desert country with very little rainfall. Consequently, all productive land is under irrigation. Since many water supplies in Arizona contain fluoride in some amount, the soil may potentially have fluoride added to it by irrigation. Smith and associates (22) were unable to show any appreciable increase in the uptake of fluoride by grains and vegetables, even when concentrations up to 3,200 ppm were artificially added to the soil in which they were grown. In a comprehensive review of the literature, McClure (23) concludes that fluoride in soil has little or no influence on the fluoride content of edible plant produce. Increased fluoride intake through use of food products grown in soil irrigated with water containing the amounts of fluoride naturally occurring in Arizona therefore seems extremely unlikely.

One other nonclimatic factor should be recognized when attempting to account for the observed regional differences in the severity of fluorosis. Generally speaking, the children included in the Arizona group were of Spanish descent (83 percent). Their dietary staple, beans, is usually prepared by boiling for rather long periods of time. Since boiling in fluoride-bearing water results in a concentration of the fluoride ion in many cooked vegetables (24), there may have been an increase in the dietary fluoride intake of this group to a greater degree than would be observed for a group of children on a more varied diet. It was not within the scope of this study to measure the influences of dietary variables upon fluoride intake.

Summary

1. The prevalence and severity of endemic dental fluorosis in 726 children were studied in six Arizona communities. The cities were located in a desert area, with mean annual temperatures of approximately 70° F., mean relative humidities of approximately 37 percent, 80 to 85 percent of possible sunshine, and extremely high daytime temperatures.

2. In water supplies of the Arizona communities studied, concentrations of fluoride above 0.8 ppm resulted in objectionable dental fluorosis; concentrations of 0.6 to 0.8 ppm resulted in an occasional diagnosis of fluorosis; concentrations below 0.6 ppm did not cause objectionable fluorosis.

3. Comparisons of the community fluorosis indexes for the Arizona communities with those obtained from selected midwestern communities indicate that fluorosis occurs at about twice the intensity in that section of Arizona as it does in the midwestern area with comparable fluoride concentrations but markedly different climatic factors.

4. Variation in temperature, radiant heat gain and relative humidity have been discussed as possible influential factors in the observed differences in endemic fluorosis between the two areas.

5. The application of a simple biological test in two areas suggests that, because of several climatological influences, Arizona children drink more water than children living in more temperate climates. As a result, there is increased ingestion of fluoride in relation to the concentration found in the water supply.

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Developing Trends and Standards of Sound Drug Therapy

—A Symposium of the AAAS—

The role of the United States Pharmacopeia, the National Formulary, New and Nonofficial Remedies, and Accepted Dental Remedies in developing and maintaining sound drug therapy trends and standards was the subject of a symposium at the annual session of the American Association for the Advancement of Science in St. Louis, December 1952.

The symposium, at which spokesmen for the four met to discuss this topic for the first time, was held at the joint session of the Association's subsection on pharmacy and its scientific section with the American Pharmaceutical Association, the American Society of Hospital Pharmacists, the American Association of Colleges of Pharmacy, and the American College of Apothecaries.

Mr. Linwood F. Tice, dean of the Philadelphia College of Pharmacy and Science, presided. Dr. Lloyd C. Miller represented the United States Pharmacopeia, Dr. Justin L. Powers, the National Formulary, Dr. R. T. Stormont, New and Nonofficial Remedies, and Dr. J. Roy Doty, Accepted Dental Remedies.

By a special arrangement with the Association and the American Journal of Pharmacy, Public Health Reports is presenting somewhat condensed versions of the five symposium papers. Comments on the symposium made by Mr. Louis C. Zopf, representing the schools of pharmacy, are also included.



Standing (left to right): Mr. Linwood F. Tice and Dr. Lloyd C. Miller. Seated: Dr. Justin L. Powers, Dr. Robert T. Stormont, Dr. J. Roy Doty, and Mr. Louis C. Zopf.

A Public Responsibility

By LINWOOD F. TICE, Ph.G., M.S.

Pharmacists and physicians in the United States often overlook the unusual but fortunate situation which we enjoy concerning the establishment of drug standards. In most countries, a pharmacopeial commission is selected and

Mr. Tice, professor of pharmacy and dean of the Philadelphia College of Pharmacy and Science, acted as panel moderator. Mr. Tice is also a member of the revision committee of the United States Pharmacopeia.

empowered by the government to choose drugs warranting official recognition and to establish their standards for purity and strength.

In this country, a group of experts, the Committee of Revision of the United States Pharmacopeia, are selected by and from those physicians, pharmacists, chemists, and pharmacologists who represent all organizations having a recognized interest in drug standards. These experts are elected by a democratic process at each Decennial Convention of the United States Pharmacopeia. They, then, serve until their successors are elected at the next convention.

The National Formulary Committee, likewise, is composed of experts selected by the American Pharmaceutical Association without political or governmental interference.

The Congress has recognized the finished work of these two groups—the United States Pharmacopeia and the National Formulary—as establishing the legal standards for drugs in the United States. Supplementing these two books of legal standards are New and Non-official Remedies and Accepted Dental Remedies. The former represents those drugs meeting the qualifications as to nature, use, claims, and so forth imposed by the Council on Pharmacy and Chemistry of the American Medical Association. Accepted Dental Remedies lists those meeting the requirements of the Council on Dental Therapeutics of the American Dental Association.

These four books, U.S.P., N.F., N.N.R., and A.D.R., are true examples of democracy in action and ones of which we, as a free people, can rightfully be proud.

As in all democratic institutions, however, freedom imposes with it a responsibility, and those who help establish policy and guide the affairs of these books must keep this great public responsibility constantly in mind. Each of the five symposium members is intimately concerned with one of these official or standard books and the policy and program governing them. Each is, in fact, a key individual concerned in each instance. That each one has recognized his responsibility not only to the public but to the professions concerned in this work is evidenced by his presence at the symposium.

The United States Pharmacopeia

By LLOYD C. MILLER, Ph.D.

Specifying standards of quality and purity for drugs, the United States Pharmacopeia is published every 5 years by a permanent organization which was first created in 1820. The organization consists of a board of trustees, a panel of officers, a permanent secretariat, and a revision committee of 60 experts.

Members of the revision committee are selected for their knowledge of all branches of medicine, chemistry, and pharmacy which conceivably can contribute in an important way to the technical work of revising the list of drugs included in the Pharmacopeia and their standards. The work of the committee is organized and directed from permanent headquarters in New York City.

The revision committee consists of 20 experts in medicine and 40 experts from the pharmaceutical and allied professions. The primary responsibility of the 20 physicians is to determine what drugs represent the best practice and teaching of medicine. It is the responsibility of the 40 other committee members to determine how pure and potent these drugs shall be and to provide methods by which these qualities may be determined.

Of course, the specifications vary according to the nature and end use of the drug. A crude drug used as the starting material of a pharmacopeial item is far different from a drug intended for intravenous administration.

The Pharmacopeia must concern itself not only with the quality of the drug but with its packaging and storage so that its initial quality will not be modified. This concern extends, of course, to the nature of the containers and the length of time the drug is safe for use if it is subject to deterioration.

The Pharmacopeia has other ancillary functions, but its main purposes are to determine

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what drugs shall be given pharmacopeial status and how pure must these drugs be.

U.S.P. Function

How much does the United States Pharmacopeia influence drug therapy trends now?—is a question which defies answering in definite terms. An answer is important in determining whether the Pharmacopeia is doing enough or might do more. This question has never been made the subject of an opinion poll, nor is it likely to be, but a fairly sound estimate is possible by looking closely at these accepted facts:

1. The official (United States Pharmacopeia and National Formulary) drugs are emphasized in teaching students of medicine and students of pharmacy. Their familiarity with the official drugs is bound to increase the use of U.S.P. drugs. Conversely, drugs which do not have official listing are less favored because they are less well known.

2. The official drugs are of a standard quality which is not subject to unannounced changes dictated by whim or trivial considerations. Only after careful study and often extensive investigation in the laboratory are revisions in the U.S.P. standards made.

3. Within limits imposed by the patient's need, the official drugs are the agents of choice in those cases covered by such health insurance plans as the Blue Cross. Many health insurance contracts call for payment only for the official drugs. In some ways, this represents a handicap imposed for convenience, but it gives the United States Pharmacopeia a real responsibility. The branches of the Government which procure drugs in quantity—the Armed Forces, the Public Health Service, and the Veterans Administration—all draw heavily upon the United States Pharmacopeia.

4. The official drugs are generally less expensive than the nonofficial drugs because most of their research and development costs have been charged off over the years since their introduction. Relatively few of them are subject to patent control so that all the forces of competition are brought to bear on keeping down the cost of manufacture and distribution.

5. Under the new Food, Drug, and Cosmetic Act of 1938 as well as under the original act of

1906, the Congress directs the Food and Drug Administration to utilize the United States Pharmacopeia and the National Formulary to insure quality, purity, and potency of drugs moving in interstate commerce. In consequence, most of the individual States similarly direct their boards of pharmacy to use the official compendiums as the basis of their regulatory activities. It is an outgrowth of this adoption of the United States Pharmacopeia and the National Formulary that led to a serious complication. It arises from the fact that in many States the official drugs may be sold only under the direction of a qualified pharmacist. Strong forces are working to extend the marketing outlets of many well-established drugs so that they may be sold, for example, in grocery stores. Since obviously few grocery stores are interested in employing a pharmacist, there is much pressure to modify existing "restrictive sales" provisions. Although the United States Pharmacopeia takes no sides in this controversy, the backwash from it lapped at the very foundation of the authority on which rests the whole pharmacopeial program in this country.

Wisconsin Decision

A case arose which has been passed upon by the Supreme Court of Wisconsin since the date of this symposium. The validity of the Wisconsin State Pharmacy Act was challenged on the grounds that its dependence upon the United States Pharmacopeia constitutes delegation of legislative authority to a body not responsible to the Wisconsin State Legislature. In ruling against this challenge, the court quoted an 1873 Pennsylvania decision as follows:

"... the true distinction . . . is this: The legislature cannot delegate its power to make a law; but it can make a law to delegate a power to determine some fact or state of things upon which the law makes, or intends to make, its own action depend. To deny this would be to stop the wheels of government. There are many things upon which wise and useful legislation must depend, which cannot be known to the law-making power and must, therefore, be a subject of inquiry and determination outside of the halls of legislation."

Experts on constitutional law look upon this decision as most important in establishing the authority of the United States Pharmacopeia as well as the validity of this aspect of not only the pharmacy acts of the 48 States but of the Federal Food, Drug, and Cosmetic Act.

Subcommittee on Scope

All the five functions noted above emphasize the importance of the selection of the drugs which make up the Pharmacopeia. This emphasis justifies elaborating upon this primary responsibility of the revision committee.

The scope of the Pharmacopeia, by which is meant the contents so far as individual drugs are concerned, is the responsibility of the Subcommittee on Scope, one of the 10 subgroups of the Committee of Revision. The subcommittee includes the 20 physicians of the committee and 5 of the pharmacists who are more intimately familiar with prescription practices. The physicians represent such specialties as surgery, anesthesiology, endocrinology, and others.

It was natural for each physician to take the responsibility of heading a panel of fellow specialists to bring to the subcommittee a synthesis of opinion of what drugs are required in the best practice of his particular specialty. Thus, literally hundreds of physicians were polled for advice on what drugs they felt were essential or at least highly valuable in their practice. In conducting these surveys, it proved difficult to convey to the individual physician what the Pharmacopeia represents; many had little or no previous knowledge of it.

The United States Pharmacopeia may now wield a great influence on the quality of drugs which the physician uses, but until physicians generally come to look upon it as an authoritative guide to the best drugs, it will not be wielding the maximum influence in trends in the use of those drugs.

Pharmaceutical Information

How, then, can we get the physician's attention to a greater extent? Obviously, we should not ask for it until we deserve it and are prepared to keep it. We shall not deserve the physician's confidence until he can feel that the Pharmacopeia offers an indispensable and unique service.

Our greatest opportunity for serving the medical profession, I believe, lies in creating a pharmaceutical information bureau. We might begin by compiling data on the therapeutic usefulness of the new drugs, particularly those whose status is controversial.

It has been suggested that eventually our files should contain information on every Pharmacopeial drug. While this information would be primarily for the Subcommittee on Scope, it should be made available freely to all requesting it.

It has also been suggested, and even strongly advocated, that the United States Pharmacopeia publish a handbook of this kind of information for physicians. The suggestion was rejected by the U.S.P. Convention of 1950, and there is no thought now of attempting to disseminate the information broadly in such a fashion.

One practical difficulty in setting up such a service would be keeping it within bounds. The U.S.P. office cannot be expanded without limit to perform the extra work. It would be unwise to increase markedly the price of the Pharmacopeia to finance the project when its sales represent our only substantial source of income. It would be feasible to offer the information service to all requesting it, but to mail literature to nearly every owner of a current edition would be prohibitive in cost. It might be possible to dispense the information more economically through existing publications in the form of periodic reports.

In this connection, we might set up a register of the brands and trade names of the official drugs. Complete information on these is generally unavailable, although the annual editions of the *Drug Topics Red Book* and the *American Druggist Blue Book* give a great amount.

To increase the influence of the United States Pharmacopeia in these directions, it would seem necessary to create a more widespread awareness of what conformance with U.S.P. standards guarantees to the general public, to the medical profession, and possibly, even to the pharmacists. This order of listing corresponds directly to the difficulty of reaching groups involved, and inversely to the need for information. The general public has little awareness of the Pharmacopeia whereas to the pharmacist

it is a reference text which he studied intently in his student days.

There is little glamour in the U.S.P. program. It does not lend itself to popular magazine articles, and even the most gifted Chautauqua speaker could scarcely work up any enduring enthusiasm over it. This is a real handicap in getting favorable publicity.

However, we have two avenues for disseminating information about the Pharmacopeia and for eliciting helpful comments on its program. One of these is the direct contact with those immediately concerned with drugs and drug standards, particularly the regulatory agencies and the manufacturing pharmaceutical houses. The second avenue of approach is in professional forums.

The swiftest way of enhancing the influence of the United States Pharmacopeia will be to enter on a campaign to reach every medical and dental student in the United States at some time during his 4-year course of study. This may be done in a short lecture which can also cover the functions of the Food and Drug Administration and the other government agencies concerned with drugs. It is particularly important for physicians to get a clear picture of these interrelationships. Obviously, it is out of the question for any one person to tell the story in every medical and dental school. Perhaps the best approach is to commission some faculty member, probably the professor of pharmacology or medicine, to give the lecture for which material could be provided from the U.S.P. office.

Another way of reaching physicians would be through the committees on hospital formularies in every hospital. These committees now represent sources of assistance to the United States Pharmacopeia but would offer ideal channels for the influx of information.

Summary

The United States Pharmacopeia can and should do more to improve the intelligent use of the best therapeutic agents available to physicians through pharmacists. It can succeed in this effort by judicious expansion of its present facilities to create an information center

for the use of pharmacy and medicine. Suggestions along this line will be welcomed.

The National Formulary

By JUSTIN L. POWERS, Ph.D.

The present status of the National Formulary stems from the authority derived from the Federal Food, Drug, and Cosmetic Act of 1938. The act states in part that the term "drug" means "articles recognized in the official United States Pharmacopoeia, the official Homeopathic Pharmacopoeia of the United States, or the official National Formulary, or any supplement to any of them . . ."

Section 501 (c) of this statute requires that drugs purporting to be those listed in the National Formulary must conform to the standards of strength, quality, purity, and identity prescribed by that compendium. All determinations of these standards must be made in accordance with the methods described therein. Variations from these standards are permitted only when the identity of a drug is unchanged, and certain labeling requirements of the act are met.

The same section of the act confers authority upon the Administrator of the Food and Drug Administration to prescribe tests where none have been provided or where those described are, in his opinion, insufficient. Before this provision can be invoked, a complicated procedure spelled out in the act must be followed. Not once in 13 years has the Food and Drug Administration found it necessary to invoke this safeguarding provision that gives the right to take away from the National Formulary and the United States Pharmacopeia a part of their standard-making functions. I think this is a significant point in establishing the role of the National Formulary in maintaining sound drug standards.

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Another section of the act declares that a drug shall be deemed misbranded if it purports to be a drug recognized by name in an official compendium unless it is packaged and labeled as prescribed therein.

Basis of Admissions

Admissions of drugs to the National Formulary are based upon their therapeutic value, the extent of their use, or both. When therapeutic value is a consideration, admissions to the 10th edition of the National Formulary will be based on the advice and recommendations of a special committee of medical consultants.

Where extent of use is the principal criterion for admission, it is determined by a consideration of trends in drug therapy, by information obtained from prescription ingredients, by extent-of-use surveys conducted by the National Formulary and others, and by a study of drug market reports.

Prescription surveys which report results only in terms of types of drugs used in compounding and dispensing are of little significance to the Committee on National Formulary of the American Pharmaceutical Association in determining extent of use. These surveys usually report that a large percentage of the prescriptions studied are for "specialties," a small percentage are for U.S.P. drugs, and a still smaller percentage are for N.F. drugs. These reports have the added disadvantage of creating an incorrect impression about the role of the official compendiums in developing and maintaining sound standards for drugs.

Of greater service are surveys such as that by J. S. Mordell, in which the incidences of occurrence of drugs in prescriptions are recorded in terms of official names in addition to the restricted names. We all know that many official drugs are distributed under one or more trade-mark names, but they are still official drugs because in their labeling they purport to be items whose names and standards appear in the official compendiums. We sometimes forget that an official drug by any other name than an official name is still an official drug and must comply with official standards. We are finding the information in Mordell's comprehensive study useful in deciding on deletions from the ninth edition of the National Formulary.

In contrast to the basis of admissions to the National Formulary, the United States Pharmacopeia has followed a more conservative policy. In general, its scope has always been restricted to drugs selected by representatives of the medical profession and believed by them to possess the greatest therapeutic merit. Extensive duplication of drugs having essentially the same action in any single therapeutic classification has been avoided as far as feasible. This selectivity has prevented the inclusion of many drugs of therapeutic value or extensive use, or both, and is responsible for the origin and development of the National Formulary.

Two Valuable Services

The National Formulary performs a unique service by providing official standards for extensively used and therapeutically effective drugs not covered by the Pharmacopeia. It may establish specifications for widely used drugs such as rutin or vitamin E concerning the utility of which medical opinion is divided. It provides for the continuance of official standards for drugs deleted from the United States Pharmacopeia during periodic revisions. Many of these drugs continue to be used extensively for many years after losing their Pharmacopeial status. We believe the ultimate consumer is entitled to assurance of the integrity of drugs in these categories through the protection offered by official standards. During periods of shortages of critical materials used in the manufacture of dosage forms, as when glycerin was scarce during World War II, the National Formulary has been instrumental in developing official specifications for safe and satisfactory replacements.

The National Formulary also performs a distinct service to pharmacists and pharmaceutical manufacturers by providing specifications for the procurement of drugs used in dispensing, prescription-compounding, and manufacturing, and in formulas and working directions for the preparation of dosage forms.

We are conscious that the official compendiums ought to be made more useful to the practicing pharmacist. I believe this can be accomplished best by furnishing certain background information which he can use in his everyday practice. Plans have been formu-

lated for doing this in subsequent revisions of the National Formulary by the device of an appendix, the content of which cannot be construed as constituting official standards.

New and Nonofficial Remedies

By R. T. STORMONT, M.D.

The Council on Pharmacy and Chemistry of the American Medical Association was organized in 1905 to serve the medical profession by providing authoritative information about therapeutic agents.

At first the council was primarily concerned with the problem of exposing quackery in the field of therapeutics. Secret remedies, promoted under false or grossly exaggerated claims, provided a major target of attack. After the enactment of laws providing for more stringent regulatory control over drugs, the council tended to devote its efforts more toward the encouragement of a constructive program of rational therapeutics. This is reflected by the fact that the annual publication, *New and Nonofficial Remedies*, is generally regarded as the major contribution of the council toward advancing the science, if not the art, of medicine.

What is the exact nature of the information contained in *New and Nonofficial Remedies*? At present the book consists of two major divisions. The first section deals with general statements on broad classifications of preparations and monographs describing the actions, usage, and dosage of specific council-accepted drugs. The second section contains physical descriptions, tests for identity and purity, and methods of assay for the active ingredients and dosage forms of those council-accepted drugs for which official standards are not yet available. Thus, the importance of *New and Non-*

official Remedies in developing and maintaining sound drug therapy trends would appear to be self-evident. However, there are certain points which deserve some emphasis.

Physician's Guide

Nomenclature of drugs is a rather important, though admittedly somewhat tedious, matter. The council always desires to cooperate with pharmaceutical manufacturers in the selection of generic or nonproprietary names for new drugs. The council encourages manufacturers to submit proposed generic and trade names for new products even before they are ready for the market. The early adoption of nonprotected designations for medicinal agents tends to obviate a certain amount of needless confusion in the literature. Usually such names are subsequently adopted by the United States Pharmacopeia and the National Formulary.

A drug which is accepted for inclusion in *New and Nonofficial Remedies* must be marketed and promoted in conformity with the rules of the council. The advertising and labeling must not contain claims unacceptable to the council. It is the responsibility of the drug manufacturer to submit the evidence necessary to convince the council that any proposed claims are justified.

The average physician today does not have the time or facilities to evaluate new drugs himself and to determine their proper indications for use, contraindications, limitations, and hazards. Not infrequently he finds it most difficult to study authoritative reports of the developments in therapy which are published in medical journals. He may or may not obtain reliable and useful information from a drug detail man or from promotional copy. Under these circumstances *New and Nonofficial Remedies* serves as a most useful reference volume or guide for rational therapeutics.

Some drug manufacturers and physicians have wondered why relatively few mixtures have been accepted for inclusion in *New and Nonofficial Remedies*. Obviously, it is the right and duty of a physician to know the essential composition of the drugs he prescribes. He also wishes to know if the mixtures are unnecessarily complex. He must be mindful of the fallacy of routinely prescribing unnecessarily

Dr. Stormont is secretary of the Council on Pharmacy and Chemistry of the American Medical Association, Chicago.

potent agents and of prescribing several drugs of different actions in fixed proportions in one preparation. More often than not he has to adjust the dose of a worthwhile drug to fit the therapeutic needs of the patient. The council believes that any drug should be administered according to the specific needs of the patient. Thus, a mixture containing phenobarbital and atropine in fixed proportion frequently does not serve the best interests of the patient inasmuch as he is apt to be either overdosed or underdosed with one of the active constituents.

Occasionally physicians are somewhat puzzled when an admittedly useful drug which has been on the market for a number of years does not appear in *New and Nonofficial Remedies*. The usual explanation is that the manufacturer has simply neglected to submit the drug to the council for acceptance. This seeming deficiency is becoming less important as firms become increasingly aware of the need and desirability of securing council acceptance for their most worthwhile products.

Modified Scope

In what respects is *New and Nonofficial Remedies* subject to criticism and how may it be improved? Inasmuch as the primary objective of this publication is to provide authoritative information on relatively new drugs, monographs on morphine, atropine, and the like are conspicuous by their absence. Nevertheless, it must be recognized that many old and well-known medicinal agents still have a most necessary and valuable place in our therapeutic armamentarium. An attempt will be made in future editions of *New and Nonofficial Remedies* to present more adequately the comparative virtues of the old and well-established official drugs in relation to the newly introduced agents. Thus, the physician should be better aided in making his choice of medication for a particular disease condition. That is one way in which *New and Nonofficial Remedies* can be improved and made more useful for both the physician and medical student.

Even though *New and Nonofficial Remedies* is revised annually, it is impossible to keep the book up to date on all developments in modern therapeutics. New drugs are being introduced with ever-increasing rapidity. One must ad-

mit that *New and Nonofficial Remedies*, like many other scientific treatises, is out of date in some respects immediately after publication. Nevertheless, it continues to serve a most useful purpose. Sometime in the future it may be necessary to publish *New and Nonofficial Remedies* at more frequent intervals. At present, however, it would appear that publication at yearly intervals should serve the needs of the physician and the medical student who also continue to study the current authoritative medical journals.

The major change in the 1953 edition, which is now in the process of revision, essentially will involve separate publication of the two major divisions of the present volume. The reason for this seemingly radical modification should be quite obvious. Physicians, medical students, and pharmacists have little or no interest in the technical detail covered in tests and standards for drugs. They depend upon manufacturers and legal regulatory agencies to insure the purity and potency of medicinal agents. It is believed that divorcing the section on tests and standards from *New and Nonofficial Remedies* will make the book more acceptable to the great majority of individuals who rely upon it as an authoritative guide for sound therapy.

Accepted Dental Remedies

By J. ROY DOTY, Ph.D.

It has been noted that the United States Pharmacopeia and the National Formulary at the present time primarily provide standards of identity and composition which have official recognition in the Food, Drug, and Cosmetic Act. *Accepted Dental Remedies* is more nearly like *New and Nonofficial Remedies* in that each is primarily a handbook of therapeutics and is concerned only secondarily with standards of composition. The two latter books are also similar in other respects. Both are official publications of agencies of professional associa-

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tions; both provide informative monographs as well as a listing of commercial products. There is also a considerable degree of similarity in the methods which are employed to determine eligibility of products for listing in New and Nonofficial Remedies and Accepted Dental Remedies. The rules of the Council on Pharmacy and Chemistry of the American Medical Association and the provisions for acceptance of products by the Council on Dental Therapeutics of the American Dental Association both emphasize the importance of suitable names, proper labeling and advertising, and the requirement of adequate evidence for the usefulness of commercial products. Each book is revised annually to provide information of current value. For each, the conclusions of the respective councils are based upon currently available information and are subject to modification at any time that a substantial amount of new evidence becomes available.

On the other hand, there are certain dissimilarities. In New and Nonofficial Remedies, the emphasis is on newness of products, whereas Accepted Dental Remedies places considerably more emphasis upon completeness of listing of drugs useful to dentists. This is possible and appears desirable in view of the fact that the number of drugs which are useful in the practice of dentistry is considerably smaller than the number which are useful in the practice of medicine. Accepted Dental Remedies even carries some informative monographs on obsolete preparations so that the dental profession may be informed concerning products described in earlier literature. However, in these instances it is clearly indicated that the listing is intended simply to provide information and that there are no products accepted in these categories.

Further differences in the books are explainable in the differences of their intended use. Since the method of use of a particular drug by a dentist may differ from its use by a physician, it does not always follow that a drug which is suitable for inclusion in New and Nonofficial Remedies will necessarily be suitable for listing in Accepted Dental Remedies.

I would like to suggest that each of the four compendiums considered in this panel discussion serves its own particular purpose and tends

to supplement the value of the others. Certainly the size and complexity of Accepted Dental Remedies would be greatly increased if official standards of composition were not available in the Pharmacopeia and the Formulary. Although the usefulness of the latter two publications might be somewhat enhanced by the suggestions presented, it is my belief that the interests of the various professions and the public will be best served by continuing their emphasis primarily on standards related to nomenclature and composition, while New and Nonofficial Remedies and Accepted Dental Remedies continue their primary emphasis on therapeutic actions and uses.

Comments on the Symposium

By LOUIS C. ZOPF, M. S.

It is generally conceded that any group of standards becomes of increasing value directly as their usefulness becomes apparent. I can subscribe to the statements which have been made in this symposium and would like to encourage the suggestions of Dr. Lloyd C. Miller and Dr. Justin L. Powers that the two official compendiums, the United States Pharmacopeia and the National Formulary, are definitely considering expanding their usefulness to the medical profession.

It is most gratifying to learn that the American Medical Association is contemplating a change in the format of New and Nonofficial Remedies by consolidating all drug standards in one section and the pharmacologic, therapeutic information in a second section.

Physicians have learned to respect the United States Pharmacopeia and the National Formulary and have also learned to understand that they are generally referred to by the abbreviations "U. S. P." and "N. F." Their understanding of these two books, however, seems to exist only as a regard for the standards for the substances listed therein and not for the knowl-

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edge of the contents. They are certain that these books represent the highest standards of therapeutic requirements and are representative of considered judgment, clinical evaluation, and therapeutic merit.

It is not uncommon for a medical colleague to inquire of the pharmacist what *his* Pharmacopeia says about a specific product. The physician, while interested in the chemical and physical properties of a medicament, is primarily interested in its therapeutic use. For this reason, many of our medical colleagues find it convenient to use proprietary preparations. Commercial pharmaceutical organizations provide the physician with adequate literature to substantiate the validity of the therapeutic merits of their products.

Publicity alone is not sufficient. If we expect the medical profession to utilize the pharmacopoeial drugs, we should do everything possible to assist them in the methods and possibilities of their use and application of such agents.

Textbook type of information is not what is generally desired but rather concise information relative to the therapeutic possibility of the drug, its tolerance, toxicity and its incompatibilities and contraindication if such exist. Dosage, of course, is essential but this is now supplied in both the National Formulary and the United States Pharmacopeia. If the item is an official vehicle, then that vehicle should be described as to its flexibility and ramifications of usefulness.

For example, it would be well to inform the physician about the amount of water which Hydrophilic Petrolatum will absorb; the possibility of adding water to Hydrophilic Ointment to make it available in lotion form; the many features of Polyethylene Glycol Ointment including its ready removal from the skin, its nonoleaginous nature; and the question of concentrations of medicament when used in these vehicles.

New Directions for Research in Infant Care

Further research to establish the general relationships between infant mortality and such factors as income level and occupation is probably needless, according to Dr. Odin W. Anderson, research director of the Health Information Foundation, New York City (*The Child*, April 1953 issue). A direct and undiminished correlation between a high standard of living and low infant mortality is assumed. Where infant mortality rates go higher than 30 per 1,000 live births, an improvement in the standard of living will have a long-range effect, as it has since 1890 in various countries. But when the infant mortality rate drops to about 30, the broad economic and social factors operate with lessening effect. Then an increasing influence on the rate begins to be exercised by personal factors in the care of the baby, like adequacy of mothering and readiness—and ability—to use proved methods of infant care. Given the essentials of living, use of a bottle sterilizer can have a greater effect in some families on saving babies' lives than a \$500 annual increase in income.

Infant mortality is often referred to as a sensitive index level. Where the health level is low, whether in wartime or peacetime, the infant mortality is high accordingly. Rates vary widely between countries, between areas within coun-

tries, and even between residential areas within cities. Obviously, factors other than general economic ones account for the low infant mortality rates among the foreign-born Jewish group studied in an early analysis (1911 to 1916) of infant mortality in eight cities in the United States. The Jewish group experienced the lowest infant mortality rate of all groups studied—54—and the lowest neonatal mortality rate—28. Closer examination would probably reveal a pattern of infant care of a high order embedded in the Jewish culture.

Dr. Anderson believes that other than purely medical research, further exploration could well be made of the illness of babies in relation to socioeconomic factors. Another subject for investigation, he suggests, is the effect of adverse socioeconomic conditions on the unborn baby and on the ability of the mother to bear a full-term healthy baby. Two of the many questions still unanswered concerning the relationship of socioeconomic and ethnic factors to infant deaths are, he writes: What are the environmental conditions in localities where infant mortality is still extra high by modern standards? How do traditional ways of caring for infants in various ethnic groups affect the survival of infants in these groups?

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Survey of Consultant Nurses In Health Agencies

By PEARL McIVER, R.N., M.A.

AT THE REQUEST of the Council of State Nursing Directors at their meeting in California in October 1951, a limited, exploratory survey of consultant nurses employed by State and local health agencies was begun by the Public Health Service. The survey was proposed to aid State health departments in planning for nurses' participation in the many new health programs, such as chronic disease, occupational health, and mental health, and as a guide to universities which offer courses in the specialties designed to prepare consultant nurses.

Source of Data

The data were obtained from 48 State and Territorial health departments and consisted of an individual personnel history and a job description on each consultant nurse on duty January 1, 1952, in a State or local health agency. Records were received on almost 500 nurses but not all were used. Some were for personnel whose primary responsibilities were administrative rather than consultative and were therefore not included in this survey. Of the 458 consultants for whom records were received, 315 were employed by State health departments, 65 by other State agencies, and 78 by local health agencies.

The personnel histories were accurate and fairly complete for general academic education

and university preparation in public health nursing, but they were sometimes incomplete with regard to nursing experience and preparation in the specialties. Some of the job descriptions were clear and comprehensive, but many were either too general or contained too much detail. Therefore, no attempt was made to give definite numerical ratings to functions or responsibilities of the nurses.

A progress report was given to the State nursing directors who attended the American Public Health Association meeting in Cleveland in October 1952. At that meeting, the State nursing directors agreed to send to the Public Health Service author supplementary data on the amount and kind of training in a specialty for consultant nurses who were serving State agencies. By January 14, supplementary data had been received from 42 States and were added to the previous material.

After the preliminary tabulations were completed the data were given to groups of special nursing consultants in the Public Health Service and in the Children's Bureau for review and comment. The data contained so much information of interest to the Federal consultants that each group agreed to prepare a detailed report on their respective specialties. This report, however, summarizes only the general information obtained from the survey.

Responsibilities of Nursing Consultants

Primarily, a consultant nurse is an adviser to and a teacher of other nurses. Unlike a supervisor, she does not have administrative responsibility for the nurses she is helping. She

Miss McIver is chief of the Division of Public Health Nursing, Public Health Service. The material in this article was prepared by the division's staff.

gives consultation in her special field to official and voluntary health agency personnel. She also interprets the program in her specialty to the general public. Her success depends upon the needs for her special knowledge and skills, her ability to create a desire for her services where the needs exist, and her ability to fill these needs.

Consultation is a two-way channel. The consultant learns from the nurses, health officials, and general citizens what the needs are and how well the proposed plans meet those needs. The consultee benefits from the broader knowledge and experience which the consultant brings to a discussion of a common problem.

From the job descriptions submitted, the functions and responsibilities of consultants were grouped into 8 categories, of which 5 could be classified as common functions in any consultation program. These five were: education, studies and surveys to determine needs and resources, policy formation and program planning, interpretation of policies and plans, and evaluation of special programs. Most of the consultants also had some responsibilities in one or more of the other three: administration, supervision, and provision of direct services. Some were participating in the administration of a special program, some were giving direct supervision to local nurses where no local supervision was provided, and a few were providing direct services in a specialty to areas of a State where there were no organized health services.

Types of Consultants

Of the 315 consultant nurses in State health departments, 291 devoted full time to one field, and 24 served in more than one specialty or added consultation in a specialty to their general responsibilities. Only in the chronic diseases was one consultant responsible for more than two programs, and since the total number of consultants in this category (heart, cancer, geriatrics, diabetes) was small, the consultants in these fields have been grouped under the chronic disease category.

The 98 general public health nursing consultants outnumbered all other categories in State agencies. Only 18 of the 98 carried a specialty in addition to their general responsibilities. Four combined tuberculosis and gen-

eral consultation. Two were also venereal disease consultants; one was also director of field training. One gave consultation in industrial hygiene, and two in chronic disease, in addition to serving as general public health nursing consultants. Seven combined maternal and child health services and one combined crippled children's services, with general consultation.

Nursing consultants for crippled children services were the next largest group. Of 93 such consultants, 31 were employed full time by State health departments except for 1 who served part time as a general consultant. Fifty-four were full-time employees of other State agencies for crippled children. Eight were employed by local agencies.

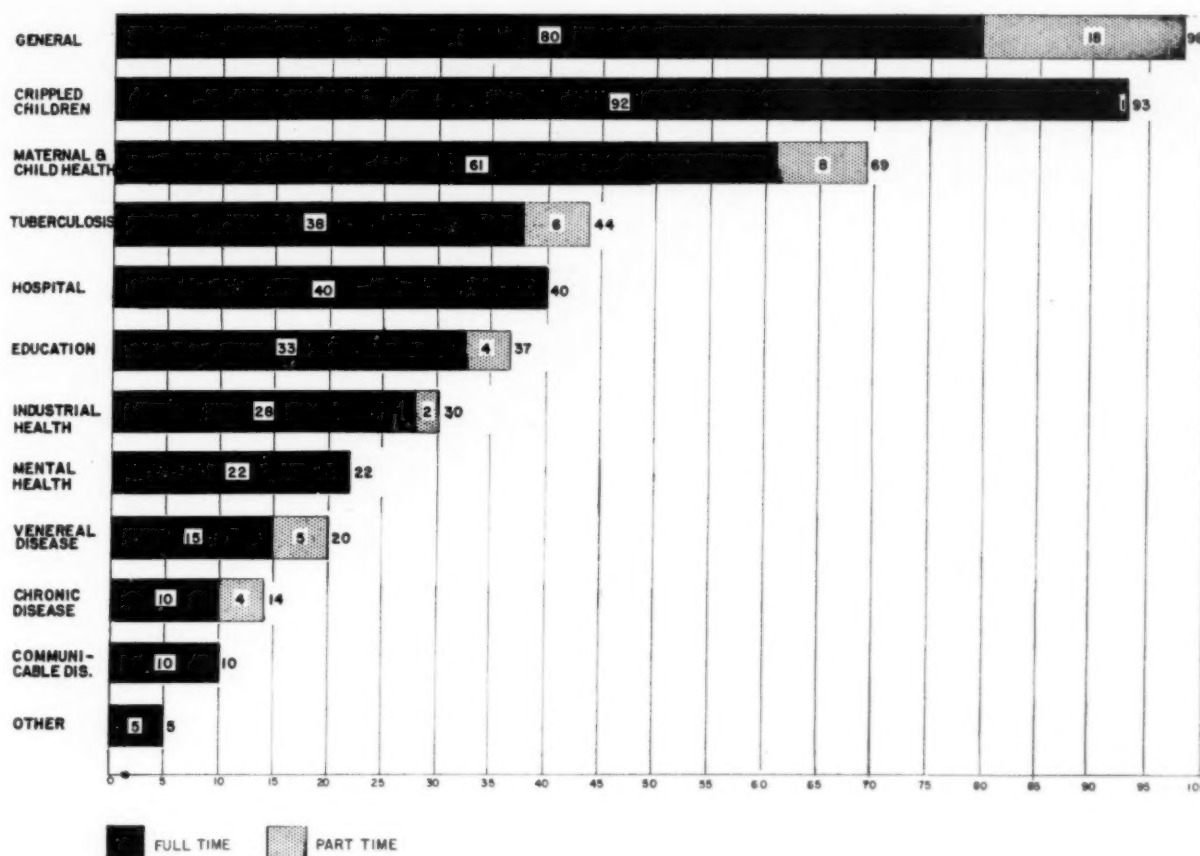
Of the 69 consultants in maternal and child health nursing, the third largest group of consultants, 53 were employed in State health departments. Forty-five in State health departments devoted full time to this field and 8 part time. The 8 carried additional responsibilities, 7 for general consultation and 1 for educational work. Sixteen were in local agencies.

Tuberculosis nursing consultants were the next largest group. Of the 44 in this specialty, 34 were employed by State health departments; 28 full time. Four served part time in the general field, 1 spent part time on venereal disease consultation, and another spent part time on the chronic disease program. Five were employed by other State agencies and 5 by local health agencies.

Hospital nursing consultants are among the newest type. A total of 40 were reported; 23 general hospital or nursing consultants on full-time duty in State health departments. There were 12 maternal and child health hospital nursing consultants in State health departments. Five hospital nursing consultants were employed full time in local health agencies.

Educational consultants were employed by 37 agencies. In State health departments, 17 served full time and 4 part time. The 4 divided their time, 1 each with general, venereal disease, industrial, and maternal and child health consultation. Educational consultants (or educational directors) made up one of the largest groups (16) in the local agencies.

Figure 1. Distribution of full-time and part-time nursing consultants in State and local health agencies by type of program on January 1, 1952. (Twenty-four consultants served part time in 48 programs.)



Of the 24 industrial nursing consultants employed by State health departments, 22 were full time. One spent part time as educational director and another carried a district for general consultation. Only one industrial consultant nurse was reported from other State agencies although previous reports indicate that there are additional industrial nursing consultants in State labor departments. Five were employed by local health agencies.

Mental health consultants ranked next with 22. Only eight worked full time in State health departments. Four were employed full time by other State agencies and 10 by local agencies.

Venereal disease nursing consultants were employed by 20 State and local agencies. Of the 15 in State health departments, 10 served full time. Two were also responsible for general consultation. One served part time in tuberculosis; one gave part of her time to

chronic disease, and one served as part-time educational consultant on field training activities. Local health agencies employed five full-time venereal disease consultants.

Chronic disease consultants compose a group of 14 nurses: 11 in State health departments, 1 in another State agency, and 2 in local agencies. Two were serving as full-time cancer nursing consultants in a State health department. In two States, cancer consultation was combined with cardiac control consultation, and in one State, cancer and general consultation were combined. In one local visiting nurse association, one nurse served in cancer control.

Two States reported full-time chronic disease nursing consultants. In one State chronic disease and general consultation were combined, and another State combined chronic disease with venereal disease control consultation. One State health department and one other

State agency supplied full-time nursing consultants on rheumatic fever, and in one State health department, tuberculosis and cardiac consultation were combined. One local health department had a full-time consultant on rehabilitation.

Communicable disease nursing consultants were a slightly smaller group. Five were serving in State health departments, and five in city health departments. All were full time.

Other nursing consultants were reported from 4 States and 1 city: 1 full-time consultant for civil defense, 1 for dental health, 1 on community organization, and 1 for vision and sight conservation. One nurse in a city health department served as a full-time consultant on records and statistics.

Figure 1 shows the distribution of nursing consultants in State and local health agencies, by type of program.

Functions of Consultants

Examination of position descriptions in terms of the eight categories of responsibilities previously cited not only indicates the scope of consultation but also reveals limitations and suggests points for further consideration.

Most of the functions of the consultants are educational. The groups to whom the educational programs were directed, in order of frequency, were State and local health personnel; nursing students, basic and graduate; hospital and other institutional workers; industrial nurses and their employers. In carrying out their responsibilities in this category, consultant nurses conducted institutes and work conferences, prepared manuals and guides, selected and distributed educational material on their specialties, demonstrated specific techniques and procedures, and oriented new personnel.

Practically every job description mentioned responsibility for studies and reports. A large number mentioned helping to plan and organize case-finding surveys for tuberculosis, diabetes, and venereal disease. A few mentioned studies of educational resources and surveys of treatment facilities in their specialties.

Only a few job descriptions mentioned participating in policy formation and in planning

the overall program in their specialties. If the consultant nurse is to make her maximum contribution to a disease control or health promotion program, she must be a member of the team having overall responsibility for that program.

If the consultant's office is in a different building, or even in a different section of the same building, will she have the opportunity to participate in informal conferences where many of the preliminary, as well as final plans are made? The job descriptions did not record policy formation and planning frequently. Does that mean that the directors of special programs minimized her contribution or that the nursing consultant believed such participation was unimportant?

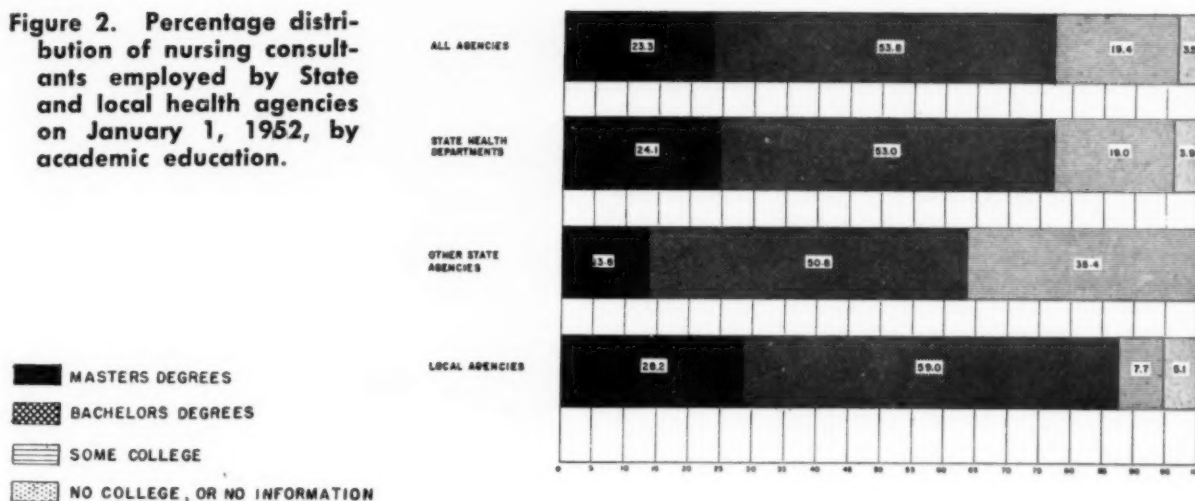
Many functions pertaining to interpreting policies and plans to local health agencies, other State agencies, and professional organizations were recorded. Since this was a frequent function of the consultant nurse, she should have a real contribution to make in the formulation and revision of policies and plans.

Only a few of the job descriptions recorded specific functions on evaluating the effectiveness of special programs and efficiency of nursing personnel functioning within the program. All of the special program divisions depend to a large extent upon the local general nursing staff to translate their programs into action in local areas. Is not one of the important purposes of a consultation program to help local health officers and nurses to measure the effectiveness of their special programs?

In most instances, consultants employed by State health departments recorded "direct service in local areas" less frequently than did the consultants employed by other State agencies. These data did not reveal why this was so, but it is logical to suggest that the State health department personnel are more familiar with local health department facilities and therefore refer special problems to the local personnel, while some other State agencies may not have as direct contact with local health agencies.

Administrative functions in connection with the special programs were recorded most frequently in those States where there was no full-time administrator of that special program or a very limited administrative staff. In one State a nurse is assistant administrator of the

Figure 2. Percentage distribution of nursing consultants employed by State and local health agencies on January 1, 1952, by academic education.



maternal and child health program. No doubt she gives some nursing consultation, but since administration was her primary responsibility, she was not included in this study. However, in another small State, the nursing consultant was the administrator of the mental hygiene program, and in one State the tuberculosis nursing consultant had the major responsibility for directing the tuberculosis control program.

Professional Preparation

Academic Education

Of the 458 consultants employed in State and local health agencies, 353, or 77.0 percent, had 1 or more college degrees. One hundred seven, or 23.3 percent, had master's degrees and 246, or 53.7 percent, had bachelor's degrees only. Eighty-nine, or 19.4 percent, had some college work and 16, or 3.4 percent, had no college work or no information was submitted on this item. The group of consultants employed in local health agencies showed the highest percentage (87.2) with degrees. State health department consultants ranked second with a percentage of 77.1 percent and the lowest percentage (64.6) was shown by the group serving in other State agencies (fig. 2).

Public Health Nursing

A program of study in public health nursing is an accepted requirement for nursing consultants in the field of public health. Four hundred and eighteen (exclusive of 40 hospital

nursing consultants) served in public health programs. Of these, 360, 86.1 percent, had completed a program of study in public health nursing; 20, 4.8 percent, had had some public health nursing study; and 38, 9.1 percent, had had none or submitted no information on this item. The consultants in local health agencies ranked highest among those who had completed a program of study in public health nursing, with a percentage of 90.4. The State health department consultants showed a percentage of 88.9 and those in other State agencies a percentage of 69.2 (fig. 3 and table).

Not every record gave information on the length of present employment. From the records, it appeared that those consultants without university preparation in public health nursing had been in their positions for a number of years.

Although a program of study in public health nursing is not considered a requirement for hospital nursing consultants, it was found that 17 of the 40 hospital consultants were so qualified. About one-third of the hospital nursing consultants reported some university preparation in their specialty.

Postgraduate Education in the Specialty

Postgraduate education in the specialty is generally thought of as one of the requirements for a consultant serving in a specialty. There has been a rapid expansion of specialties in public health programs within recent years and a

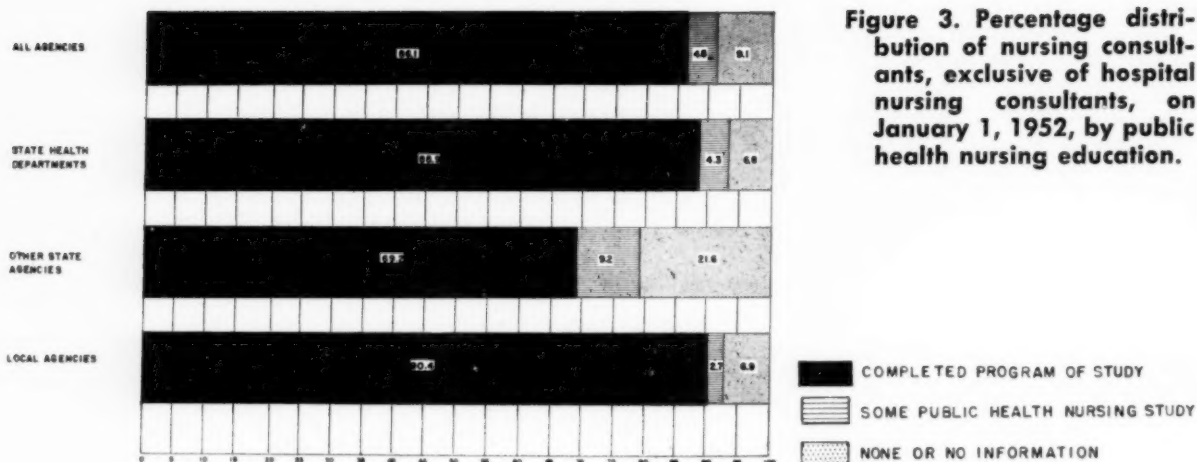


Figure 3. Percentage distribution of nursing consultants, exclusive of hospital nursing consultants, on January 1, 1952, by public health nursing education.

concomitant growth in the number of specialized nursing consultants employed. There is no clearly defined program of study for some of the categories of consultants represented in this report. The questions of what constitutes educational preparation in a specialty and what categories should be considered as specialties appear to need further exploration and study.

A sampling of data submitted on 139 consultants in State health departments (exclusive of the 80 general consultants and 96 consultants engaged in maternal and child health and programs for crippled children) revealed that 105 or slightly more than three-fourths of them had had some postgraduate education in their specialty, varying from institutes of 1 week's duration to 18 months of formal study. In view of the limitations of the data no attempt is made to show this type of education

in over-all table form. The detailed report of each specialty will include a discussion of postgraduate education in the respective fields.

Experience

When information concerning previous experience was not recorded, it was coded on the punch card as "none." Quite frequently the reviewers were reasonably certain that the answer was "no experience reported" rather than "none." However, it was not possible to separate those who failed to record experience from those who had no previous experience. Therefore, this report gives only a general picture of the background experience of the consultants.

The specialties in which the largest majority of the consultants recorded previous experience in general public health nursing supervision were venereal disease, tuberculosis, and mater-

Public health nursing education of nursing consultants employed in State and local health agencies exclusive of hospital nursing consultants, as of January 1, 1952

Type of agency	Total consultants		Amount of public health nursing education					
			Completed program of study		Some public health nursing study		None or no information	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
All agencies.....	418	100	360	86.1	20	4.8	38	9.1
State health departments.....	280	100	249	88.9	12	4.3	19	6.8
Other State agencies.....	65	100	45	69.2	6	9.2	14	21.6
Local agencies.....	73	100	66	90.4	2	2.7	5	6.9

nal and child health. Consultants in mental health, crippled children, and education ranked next highest insofar as previous public health nursing experience was concerned. About one-third of the general and industrial nursing consultants either had no previous public health experience or failed to record their past experiences.

Experience in public health nursing is a specified requirement in announcements of qualifications for appointment to any consultant position in the field of public health nursing. Many of the examination announcements specify experience in general public health nursing, and in addition, require experience as a public health nursing supervisor prior to appointment to a consultant position. Some of the States have required public health nursing experience of those nurses who were appointed as hospital nursing consultants. Desirable as it may be to have every nurse prepared for first level work in public health nursing, it would appear that, for hospital nursing consultants, experience as a hospital nursing supervisor or administrator is more important than experience as a public health nursing supervisor if only one type of experience is required.

About one-third of the hospital nursing consultants recorded public health nursing experience prior to their present assignments. All of those who had not had public health nursing experience reported experience in clinical supervision, teaching, or administration of nursing services. Two of the hospital nursing consultants with previous public health nursing experience had had no experience in clinical nursing.

Clinical experience in the specialty was reported most frequently by the public health nursing consultant in maternity and child health. About 30 percent of the industrial nursing consultants reported experience within industry which might be likened to clinical experience in the other specialties. Less than 10 percent of the consultants in the other specialties reported previous clinical experience in their specialty.

Discussion

Many of the job descriptions did not define clearly the responsibilities of the position. The

nursing service would be strengthened if these descriptions were more comprehensive. An accurate description of the duties and responsibilities of a position, kept up to date at least biennially in accordance with changes in program emphases, would help and guide a new appointee to the position.

A number of the personnel histories submitted for this study apparently were prepared years ago and from those records it would appear that the present incumbent did not meet the professional requirements specified by the State merit system agency for that particular position. For one-third of the general public health nursing consultants, no public health experience prior to that obtained in the present position was recorded. Personal acquaintance with many of these nurses convinces the reviewers that no information was given rather than the inference that so many of the general consultants had had no previous public health nursing experience.

The nursing consultants included in this study were well prepared academically for their responsibilities. Formal preparation for some of the specialties has not yet been well defined, but at least one university has experimented with, and this year is offering, a program in chronic disease and tuberculosis. What should the content include and how much time is required to prepare nursing consultants for such specialties?

A considerable number of the job descriptions specifically mentioned the consultants' responsibility in assisting basic schools of nursing with the integration of that specialty in the undergraduate curriculum. This is an encouraging development and indicates the health agencies' interest in and responsibility for participation in basic nursing education programs.

General hospital nursing consultation services in State health departments, for the most part, have been developed since the passage of the Hospital Survey and Construction Act. This consulting service was provided in 15 States on January 1, 1952.

In addition to the general hospital nursing services, it was encouraging to note the frequency with which the job descriptions of consultants in such specialties as tuberculosis, ma-

ternal and child health, cancer, and venereal disease listed as one of their functions "giving consultation to hospital and sanatorium personnel." Good patient care requires a close liaison among those persons responsible for care during the preventive and case-finding stages, the treatment period, and the recovery and rehabilitative stages.

A lack of experience or training in modern hospital procedures may have limited the number of consultants who gave service to hospitals and medical care institutions. Is clinical nursing an area that should be emphasized in in-service education programs for public health nursing consultants?

Comparatively few of the nursing consultants were designated as consultants for more than one specialty. Only 24 out of 458 were listed as specifically serving in more than one specialty. Of the 24, only 18 were general consultants with designated responsibility for a specialty also. Undoubtedly all of the 80 full-time general public health nursing consultants devoted considerable time to each of the specialties.

The newer programs, such as heart, cancer, and geriatrics, which we have tabulated as the chronic disease category, reported only 11 consultants with specific responsibility for one or a combination of specialties in State health departments. The trend in State health department organization appears to point to a combination of several disease control programs, grouped under a unit designated as the bureau of preventable diseases; or into one unit concerned with chronic or long-term illnesses; or another bureau concerned with epidemic or acute illnesses which have public health significance. It was hoped that this study would reveal a similar grouping of public health nursing combination services. The data do not reveal any significant number of combinations. Neither do these data reveal to what extent

the general consultants participated in the special programs.

Questions for Consideration

These data show that there has not been much experimentation with the idea of having one well-qualified nursing consultant to serve two or more related specialties. If all of the long-term health problems, such as heart, cancer, diabetes, geriatrics, and rehabilitation, were grouped under one bureau, could one nursing consultant serve them all if she were not required to render direct service locally in addition to her consultant functions? Could a combination of the acute communicable diseases, including venereal disease, be handled similarly by one nursing consultant skilled in epidemiological techniques and procedures? Would the educational consultants be more valuable teachers and leaders if they were skilled mental health consultant nurses since mental health should be an integral part of every health program?

Special consultation services should not be developed at the expense of adequate local nursing supervision or at the expense of the provision of high quality general public health nursing consultation which is essential to insure the coordination of all programs. There is a shortage of qualified public health nursing administrators, supervisors, and consultants. How can the services of each be used most effectively?

A study made of personnel history records and job descriptions could furnish a wealth of information provided all of these records were accurate and complete. Even with the limitations of the 1952 data in this survey, the Federal nursing consultants found the data very useful. If an effort is made by each agency to improve these two sources of information, and a number of States try some new combinations during the next few years, would it be valuable to repeat a study of this type every 5 years?



Science and Public Health Research in Alaska

Alaska, one of today's "new frontiers," is witnessing an important growth in scientific undertakings. Not the least of these are investigations in public health and related fields of science. Reviewing development of the Public Health Service's Arctic Health Research Center at Anchorage, the late Dr. Joseph W. Mountin wrote:

"In the past, public health activities have developed in the wake of civilization. Now public health is presented with an opportunity to lead civilization, to pioneer in new fields. By uncovering some of the problems of human life and adjustment in low-temperature areas, public health can become a creative force in opening up new frontiers. At the same time it can make potentially significant contributions to basic knowledge."

Last September—4 years after the beginnings of the Arctic Health Research Center—the Third Alaskan Science Conference was held at Mt. McKinley National Park under the sponsorship of the American Association for the Advancement of Science's Alaska Division, which grew out of the first Alaskan Science Conference in Washington in 1950.

Conference topics in 1952 ranged from agriculture, forestry, and botany to zoology and wildlife, and from anthropology to sociology, economics, and education. *Public Health Reports* has selected 10 papers for reporting "in brief." These represent only a few of the many topics touching upon the difficulties of introducing modern technology and methods of living to an old civilization and primitive methods of living. With one exception, all the briefs deal with specific health topics.

The exception is a paper of Dr. Margaret Lantis on the role of science in general and social science in particular in a pioneer environment which lends itself as an ideal laboratory for scientific research. This discussion is presented in the form of two briefs.

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The Trend of Science



The scientist is a person who lives for and in the future. He is a dreamer with self-discipline. His objective is to state generalizations, principles, propositions, tendencies, and laws that are the bases for prediction.

The scientist must always stand the test of prediction, for prediction is an essential part of scientific method. Even though a paleontologist or archeologist is concerned with reconstruction of the past and does not expect to see trilobites or Mousterian man on earth again, he uses history to formulate principles of anatomic or cultural change. In other fields, the use of prediction is even more immediate.

But philosophers state principles, and everyone predicts. Any person functioning as a scientist is different, however, in his use of exact methods, in his willingness to reveal these methods to others without distortion, and in his integrity and impersonality in stating his observations. Thus, he is, or should be, always conscious of standing the test of the future. He constantly seeks new ideas, new methods.

The scientist disciplines himself in formulating exact plans for research. He disciplines himself to be a meticulous observer and recorder, to make careful reports and cautious claims, and to accept criticism.

The scientist not only sees what will happen, he tries to understand why it will happen. As he learns more of the why, he becomes more accurate in predicting. He is either a watcher or a tinkerer—the natural historian or the experimenter. Both are necessary. Generally, the watchers have preceded the tinkerers. They had to see what was there before they started working on it. Just to go out and collect was important and sufficient 50 or 75 years ago.

Experimental Biology

In the past 50 years, the Biological Survey, the Reindeer Service, and others in Alaska have

By Margaret Lantis, Ph.D., anthropologist, Arctic-Desert-Tropic Information Center, Maxwell Air Force Base, Ala. This and the following brief are from one paper.

made field experiments, necessarily uncontrolled for the most part; hence, with more hope than prediction. Then, in 1948 the Arctic Health Research Center of the Public Health Service was established. Its work leads us to the real objective of science, from a humanistic standpoint: treatment and prevention. Along another line of development is biological engineering, one form of which is exemplified in the Fishery Products Laboratory, another new institution in Alaska. There is also the Agricultural Experiment Station. But laboratory experimentation in special fields of zoology and physiology is recent in Alaska.

In other new programs in Alaska, the scientists are, as usual, looking ahead, in application as well as in the formulation of theory. This is especially true when we are studying behavior. Are the southeast Alaskans successfully combating tuberculosis while the interior Indians are not? Ten or 50 years later, no doubt one can say what happened, but he may have difficulty answering the questions of why and how. It is important, therefore, to study events while they are happening, not after they happen.

The modern scientist is just the opposite of the popular stereotype who mounts moths on pins but is unaware that caterpillars are destroying the orchard. Even if he is not an economic entomologist, the modern scientist, because he is so interested in processes, in the dynamics of life, is a Johnny-on-the-spot, watching the processes as they occur.

The Social Sciences

Sociology has suffered from both internal and external difficulties. Internally, there was too much and too early emphasis on social pathology. The curriculum contained courses labeled "criminology," "social disorganization," and "problems of social welfare." Ecology seemed to become only a study of blighted areas of cities. Lectures on "the family" dealt chiefly with family disintegration and divorce. The sociologist and some of his fellow social scientists always seemed to show up the worst in the community. Just by trying to be disciplined scientists, they antagonized many laymen, especially civic boosters.

The psychologist has had the same difficulty whenever he went beyond a study of special

abilities. In the study of the dynamics of the personality, there was more "abnormal" than "normal" psychology. And the layman felt uncomfortable and suspicious. Instead of being reminded how remarkably subtle and clever, yet consistent and strong, is the individual personality, he was made to feel that he was full of irreconcilable conflicts and about to go off his rocker.

Fortunately, in sociology, social anthropology, and social psychology the early stage of discovering all the awful things that are wrong with man—his logic-tight compartments, sibling rivalry and Oedipus complex, racial prejudice, and culture lag—has been passed.

Now, in psychology we are hearing about ego strength and ego ideals; in anthropology, about the cultural values—the commonly shared concepts that people live by; and in sociology, about the processes of achieving consensus or agreement. These topics of study are not only positive, they are dynamic.

The Natural History Stage

It is hard to experiment in the field of human relations when it is still in the natural history stage. We who make field studies as well as theorize about people and politics are the natural historians of man, trudging up and down the hills of society. But we now have a much better understanding of scientific problem and the formulation of hypothesis. And we have more sense in the use of special tools for field study; for example, opinion polls. It does seem that in many fields there is a renaissance of good old field observation, a refined natural history done with remarkable new tools.

Some of the social scientists also are seeing the value of a well-rounded natural history, not because they went too rapidly and exclusively into experimentation but because they tried prematurely to formulate rigid laws. Economists, for example, have found that economic man is at the same time social man and political man. Another difficulty, or supposed obstacle in social science, is the complexity of human behavior. Actually, it is not as complex as, for example, the chemistry of the human body. The only difficulty is simply the lack of data: the number of scientific observers for such a very big subject is very small.

The Social Sciences

PHR
brief

Where does Alaska fit in the trend of science? What should the scientist study in Alaska? Clearly Alaska needs people working in basic social science, studying processes of the formation of a new society. For nowhere—certainly not in Alaska—is there now enough of basic science in the field of social relations. Yet few areas offer better opportunities to study the social dynamics of a city virtually from the beginning than does Anchorage with its population growing so fast that it's almost a demographic explosion. Social organizations are multiplying in Alaska like rabbits in Australia.

Alaska offers a manageable field for study. Its communities, although growing, are not yet too large or too suburban to be studied profitably as functional entities. Whether the communities and the clubs and the customs are just starting or are dying, as some Alaskan villages are, the interrelationships throughout the Territory and between it and the States can be studied. Migration can be stated more exactly in Alaska than, for example, in a single State.

Every real scientist accepts the necessity of prediction. And Alaska needs prediction, if it is not to become a neglected social and political jungle. It needs not only the field observer and the basic scientist, it needs also the man who will apply the generalizations to specific problems. Everyone suffers from the malfunctioning of social institutions, and some suffer from the changes that must be made. The social scientist may be unwilling to commit himself on a prediction, or he may make a mistake when he does commit himself, but we need him in Alaska so much that we can risk giving him a crack at the job.

The Study of Man

Except in the specific field of health, there is no research agency in Alaska comparable to the Geological Survey and the Fish and Wildlife Service for studying the most important animal

By Margaret Lantis, Ph.D.

of all: man himself. The Geological Survey is studying the processes of solifluction and the boundaries of permafrost. Because of its work, engineers today and in the future can build better on permafrost.

In contrast, no one is learning how to handle the processes of competition and cooperation so that there won't be a "frost-heave" in the community every summer when migratory workers come in. No one is studying the shifting boundaries between private development of a new area and government development.

A scientific discipline's usefulness depends not only on its ability to do the necessary job but on its being given the opportunity to work. Many of the natural and physical sciences have had this opportunity in Alaska; now the social scientists need their chance. I don't want to imply that they are completely absent from Alaskan research, for I know of 11 recent and current social science studies. Four are being made by economists, and others are by anthropologists, physicians, housing specialists, and church workers. Sociologists and political scientists, however, are absent.

Every frontier region has to reach a certain stage of social organization before it can support professional specialization. Each of the American frontiers in succession seems to have gone through similar stages. Alaska offers just as exciting opportunities to the sociologist or social psychologist as to the archeologist who finds there ancient cultures beautifully kept on ice. Alaska contains all the stages of modern American culture, not on ice but decidedly viable and excitable. Alaska has little deadwood in its society and few vested interests.

Ready for Study

Alaska is at the right stage of general cultural development to accept professional social study of itself. Of course, we can expect public opposition to social science in Alaska; we can also expect disappointing and inadequate work by the social scientists. It is hard enough to understand an ant colony. How much more difficult to study ants with ideas!

At Alaska's present stage of readiness, perhaps it only wants to know how big it's getting to be. Perhaps it only wants to know how

many robbers it has in order to decide how many cops it needs. Such counting of heads or sticky fingers is not enough. Instead of merely surveying the social pathology of the Territory, or of surveying anything, we need to study dynamic processes. Although Alaska is not the only new society and new economy that might be studied, and even though many processes at work there may have been observed elsewhere, it does offer a fine new opportunity that should not be missed. I suppose volcanologists did not make any stupendous discoveries from Paracutin, but I'm sure some of them managed to get to that cornfield where a little volcano was sprouting.

Socioeconomic Trend

What should we study in Alaska? Examine, for example, the socioeconomic trend of development, and consider what we must know in order to accommodate that trend, to adjust to it.

Agriculture will increase in some parts of Alaska, but as in Norway and Sweden, mines, manufactures, and fisheries can support a growing population and economy far better than agriculture. A nonagricultural region like Alaska can be economically useful in production of raw materials, in processing and manufacturing, and in provision of services including trade. Until recently, the Territory's economy has been based almost exclusively on the exploitation of natural resources: fur-bearing and oil-bearing animals, fish, minerals, and, to a small extent, timber. With the exception of fish, virtually all products were shipped out unprocessed.

Now that the Alaskan economy is getting its new start by means of a construction boom, the first requirements are for local processing plants to provide construction materials, power to run the plants, local skilled labor, and the service trades. Getting out raw materials with modern technology means few men and much heavy equipment. Processing plants and especially the service facilities require workers. A particular type of economy facilitates or even requires a particular type of society and political organization. Little enough is still known about the relations between economy, society, and politics; and Alaska is just the place to

study them. As examples, I suggest studies of the following questions as necessary and practical:

Concepts of capital. What are the attitudes of old settlers, of newcomers, of the different native peoples toward land—land as an investment, as a place to live?

The people and their skills. What types of people are coming to Alaska? What has been their level "outside"? What skills do they have that they are not using? What new skills are they acquiring?

Community structure and political structure. What do new settlers miss most in community life and in political system? What do the native peoples miss most in their present stage of partial acculturation?

Understanding Mankind

In sum, we have three dynamic relationships to study: the people and their material resources; the people and their socioeconomic system; and the people and their political system.

There is, of course, no political system without people. One can talk about a system, but I mean the ideas that individuals live by—their unstated assumptions, their expectations, their struggles to get what they want, in a job or a place in the community. To learn about these cultural values, one does not mimeograph the kind of questions I have just phrased and then distribute a questionnaire. This is a job for professionals, and a tough job even for them.

To make life more satisfactory for Alaskans, one must study Alaska. But in undertaking the processes of behavior in any group, one understands more about mankind and contributes to basic science.

Enteric Diseases



Vital to the control of enteric diseases in Alaska is the provision of safe and adequate water supply and sewage disposal systems.

Of the 63 communities in Alaska with populations of 200 or more, only 29 have limited

water distribution systems. Only 5 have community sewage disposal facilities. In the other 223 Alaskan communities, individuals obtain water from single premise wells, community wells, rivers, lakes, lake ice, or snow fields. These communities and villages dispose of sewage through single premise systems, by scavenger service, or by dumping the collected wastes not far from the dwellings.

Contaminated water supplies and improper sewage disposal have been the major causes of the gastroenteritis outbreaks recently compiled for the period 1900–52 from records of the Alaska Department of Health, Alaska Native Service hospitals, and from other government reports and personal correspondence.

The data are incomplete in some instances because of incomplete reporting and loss of records. One case on the record does not preclude the existence of others, and sometimes only deaths were reported. No cases of bacillary dysentery, for example, were reported in 1944 from the Kuskokwim area where records give this disease as the cause of 97 deaths.

It was not until 1936 that the first public health laboratory was established for the Territory, and diagnostic bacteriological laboratory services became available to hospitals, physicians, public health personnel, and field nurses for enteric disease studies.

But the history of the outbreaks does indicate the extent of enteric diseases, such as typhoid fever, paratyphoid fever, and bacillary dysentery caused by *Salmonella* and *Shigella* organisms. Cases have been reported from Barrow to Ketchikan and from Unalaska in the Aleutian Islands to the Canadian border.

In 10 areas where hospital care, medical facilities, and transportation are available and the reporting is therefore more complete, records indicate that salmonellosis and shigellosis are endemic.

The first mention of an outbreak resembling bacillary dysentery was in 1807 in Unalaska, but until 1900 there were no medical records of

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enteric cases in Alaska. From that date to July 1952 a total of 274 cases (24 deaths) of typhoid fever, paratyphoid fever, and salmonellosis were reported. On record for the 1937-51 period are 340 cases, including 110 deaths, of bacillary dysentery and shigellosis.

Typical Typhoid Outbreaks

Typhoid carriers have been found in the Norton Sound, Nushagak, and Anchorage areas. In 1900, two cases of typhoid fever were reported from Golovin on Norton Sound. These two persons were found to be "healthy" carriers of *Salmonella typhi* in 1941 during an epidemiological investigation of a typhoid fever outbreak in the Golovin-Elim area. And one of them, a trader who visited the villages along Norton Sound, was linked with the outbreak. From 1900 to 1941 there were 24 cases, 3 of them fatal. The carriers were placed under medical care, and no further cases have been reported from this area.

Typhoid fever may have spread to Norton Sound from the Dawson area, Yukon Territory, Canada, where an epidemic occurred in the spring and summer of 1898 during the Klondike gold rush. Deaths were reported to be from 10 to 12 a day during the epidemic. River water was indicated as the source of the infection.

Since 1936, 7 outbreaks of typhoid fever, 4 of them waterborne, have been reported from the Nushagak area, center of salmon fishing and cannery activity. During the fishing season, the Eskimo and Indian families from the surrounding villages move into crowded tent camps with no sewage facilities except convenient bushes or creek banks. They get drinking water from the most convenient pond, creek, or well. In the largest community, a local well is the town supply. Drinking water is collected by clearing away the surface debris of paper and dog hair and dipping the water out. Dogs and men have the same easy access to the well water—there is no curbing or cover. In addition, the well is at the base of a bluff in a ravine that drains the village graveyard 150 feet away. Diarrhea has been prevalent among the children, and villagers expect that some of the children will die every year from this disease.

Altogether, 42 cases (6 fatal) of typhoid fever

are on record for the Nushagak Bay area since 1936. In 1951, the mother of a child with typhoid fever was discovered to be a carrier of *S. typhi*. Several other possible carriers have been detected.

In the Anchorage area, carriers were found in the 1947, 1950, and 1952 outbreaks of typhoid fever. *S. typhi* was isolated from the 17 children and from the carrier, the mother of one of the children, in the 1950 outbreak, occurring in a congested area outside the city limits. Residents were dependent on shallow wells of 6 to 12 feet deep for water and single premise sewage disposal.

Diarrhea Prevalence

The rumors of diarrhea outbreaks that frequently sweep villages and the delayed reports that reach the Alaska Department of Health are typical of dysentery reporting in Alaska. The outbreaks commence during or shortly after the spring breakup and continue to the end of summer.

In the 1948 outbreak in the Barrow area, there were 105 cases (1 death) during a 5-month period. A field team isolated *Shigella paradysenteriae* from stool specimens of 3 cases. The following year bacillary dysentery was reported from Anaktuvuk Pass and *S. paradysenteriae* was found in 5 cases. In both outbreaks contaminated drinking water was indicated as the source.

The Unalaska bacillary dysentery outbreak in 1949 was the first opportunity for a complete epidemiological team—physician, sanitarian, and bacteriologist with field laboratory equipment—to investigate an outbreak in Alaska, determine the etiologic agent, and offer sanitary and medical aid. Investigation proved the epidemic to be a waterborne bacillary dysentery outbreak caused by *S. paradysenteriae*. Recommendations were made for improving sewage disposal methods and relocation of the water supply.

The Unalaska bacillary dysentery outbreak teric diseases are Fairbanks-Nenana, Kotzebue Sound, Kuskokwim, Juneau, and Ketchikan.

In all the outbreaks, whether waterborne or foodborne, poor sanitation plays an important part. Influx of people into crowded areas increases the health hazards already complicated

by unsatisfactory basic sanitary facilities, since the newcomers bring with them their own diseases, and carriers of typhoid fever and parasitic infestations are undetected in this group.

Animal-Borne Diseases



The study of diseases transmissible from lower vertebrates to man has been carried on since 1948 in Alaska by the Arctic Health Research Center. Emphasis to date has been placed on diseases of helminthic origin.

Hydatid Disease

It has been recognized for many years that the tapeworm *Echinococcus granulosus* exists in North America and that the wolf and the moose are essentially involved in its natural life cycle. Ruminants other than the moose may also serve as intermediate hosts, and dogs and foxes often harbor the adult parasite.

Postmortem examinations of canine animals as well as the moose have disclosed that this parasite is common in Alaska. As high as 25 percent of the sled dogs in certain villages have been found infected. The necessarily close association between man and dog in Alaska provides ample opportunity for human infection, which occurs as a result of the ingestion of tapeworm eggs eliminated in the excreta of canine animals. Living conditions in the far north often make impossible the sanitary precautions necessary to prevent human contact with the parasites.

On St. Lawrence Island, a much more pathogenic form of *Echinococcus* has been found. Its natural life cycle involves the arctic fox and at least two species of small, mouselike rodents; thus, the development of an effective control program would not be feasible should this tapeworm become established on the mainland. Dogs are as readily infected through eating

infected rodents as are foxes, and it is probable that most of the human infections are attributable to eggs disseminated by infected dogs. It is hoped that introduction of this disease into continental North America can be prevented by rational quarantine measures. Stringent control of dogs, particularly on St. Lawrence Island, is recommended. An educational program is badly needed to inform the people of the importance of this disease.

Trichinosis

An investigation of the prevalence of trichinosis in Alaskan mammals was undertaken in 1949. It was found that a wide variety, including bears, dogs, wolves, foxes, and wolverines, often harbor *Trichinella spiralis*. The parasite was also recorded from tree squirrels. A white whale was found infected, and larvae were recovered from hair seals. It is probable that trichinosis is transmitted to man from bears more often than from any other group of Alaskan mammals. Polar bears are sometimes eaten under conditions which preclude adequate cooking. The problem of trichinosis, however, is not considered a serious threat to human health in Alaska.

Diphyllobothriasis

A survey of possible terminal hosts of cestodes of the genus *Diphyllobothrium* has disclosed their occurrence in a variety of mammal species, including, besides man, bears, dogs, and foxes. They have also been observed in gulls and eagles. No comprehensive survey of the fish intermediate hosts of this tapeworm has been made, but it is obvious that in certain areas most trout exceeding 6 inches in length are infected. Some contain so many plerocercoids that fishermen consider them unfit for food.

No attempt has been made to evaluate the importance of *Diphyllobothrium* to human health. In regions where fish make up a high proportion of the diet (for example, lower Kuskokwim-Yukon country) incidence of human infection is high. Treatment so far has little value because of the probability of immediate reinfection.

If it can be established that a single species of *Diphyllobothrium* occurs in the various car-

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nivores, birds, and man, the problem of control will be complex. Infected birds particularly would serve to maintain infection in fish. Much work remains to be done on this problem.

Diseases of Nonhelminthic Origin

Important in Alaska among diseases of nonhelminthic origin is rabies. Known to be enzootic over most of the Territory, it constitutes an ever-present threat to public health. Almost every year there is an outbreak among wild or domestic canids somewhere in the Territory, but so far it has not been reported to attain epizootic proportions.

The great numbers of stray dogs to be found at any time around the larger towns, particularly Anchorage and Fairbanks, constitute an animal reservoir through which rabies might spread rapidly if once introduced. There is no provision for dog control outside the limits of incorporated towns, and control within their limits is far from adequate. No program for vaccination of dogs has been established, and there is little expectation of any.

Tularemia in man is rarely reported in Alaska, although it has been known for several years that it does occur. With increasing sport hunting of hares in the populated portions, this disease may attain some importance.

Various other diseases—brucellosis, leptospirosis, ratbite fever—have been investigated to some extent in Alaska, but their present status is indefinite. It is anticipated that these diseases and many others will receive attention in coming years.

Hydatid Disease Control



Hydatid disease is a global problem, representing a serious public health menace on every continent. Recent studies have shown that the disease is spreading from major foci of infection and

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have also discovered endemic areas that were heretofore unrecognized.

Noting the importance of hydatidosis both as a human infection and as a cause of losses in food supplies, the Third World Health Assembly (1950) requested the World Health Organization "to lend technical assistance for its eradication upon request of government authorities." In the Western Hemisphere, the Pan American Sanitary Bureau has provided assistance and international coordination to member governments in their antihydatidosis activities. Control efforts emphasize anthelmintic treatment of dogs, centralized slaughtering with sanitary waste disposal, and public health education.

Control Points

The cycle of the parasite *Echinococcus granulosus* may be interrupted by prevention of infection of the primary host (dogs, foxes, wolves, and so forth) and by prevention of transmission from the canine host to other animals.

Proper disposal of the organs of animals containing hydatid cysts will prevent the infection of dogs. Organized meat inspection to accomplish this is not practicable in all parts of the world. Furthermore, meat inspection would have no effect upon the cycle of the hydatid parasite when the secondary hosts are wild animals, a situation which obtains in Alaska.

Canine Control

It therefore appears that the most practical method of interrupting the cycle of this parasite is to attack it in its primary host, the canine. In dogs, mass deparasitization may be practiced. The great strides in hydatidosis control in Iceland are attributed in large measure to enforced limitations on the number of dogs and the periodic anthelmintic treatment of all dogs. A similar approach has been followed in Argentina, where antiechinococcal treatment of dogs is given free. This work was begun in Patagonia in 1948 and has since been carried on extensively in several other parts of Argentina. Large-scale antiparasitic treatment of dogs has also been practiced in southern Brazil.

Mass deparasitization of dogs requires community organization and enlightened public cooperation. Dog owners must be encouraged to have their dogs treated, and individual action

should be supplemented by public clinics. The dramatic action of the most widely used deparasitization drug, which purges within a few minutes, affords opportunity to demonstrate to a dog owner the existence of parasites in his dog.

Obviously mass deparasitization cannot be practiced on wild canids nor on stray dogs. However, the methods used to apprehend and eliminate the ownerless dogs may be equally applicable to the wild carnivores which carry the adult tapeworm.

A Distemperlike Disease

PHR
brief

Death or incapacitation of a large proportion of a community's dogs is a real disaster in the far north.

When an Eskimo community is deprived of its dogs, it loses the principal means of transportation. The Eskimo lives by hunting, and his dogs are his only draft animals. The loss of dogs also impairs national defense in the northern perimeter, since without a dog team extended ground scouting is impossible in the winter.

Modern transportation has complicated the control of animal diseases in Alaska as it has human diseases. For example, a New York City dog can reach Barrow by air express in less than 30 hours. This hypothetical dog may have had rabies immunization and may have been passed as "healthy" by a thorough veterinary examination. Yet, if he travels by air, he can become acutely ill in Barrow from a disease contracted in New York.

Point Barrow Epizootic

A severe epizootic of canine distemper, or a clinically related disease, occurred at Point Barrow, Alaska, in the fall of 1951 and continued into the winter. About half the dog population, an estimated 500 dogs, died or had to be destroyed because of the effects of the

disease. Administration of penicillin and streptomycin and destruction of incapacitated dogs probably hastened the natural end of the epidemic. The distemper is continuing enzootically in Barrow.

Early in July 1952, a similar or identical disease that may have been carried from Barrow by wildlife appeared among the dogs at Anaktuvuk Pass, an isolated village 200 airline miles from Point Barrow across the Arctic Slope. In the summer this terrain is traversed only by wild animals. In the winter a trip between the two places is seldom made.

The symptoms of the disease observed in the dogs at Barrow and Anaktuvuk were about the same as those of the canine distemper caused by the Laidlaw-Dunkin virus. The extreme virulence of the distemper seen in Barrow and Anaktuvuk dogs was notably different from that ordinarily seen in the States.

Chorea and other neurological disorders in the Alaskan dogs commonly coexisted with the acute symptoms of nasal and eye discharge. Neurological symptoms—hyperexcitability, chorea, paresis, and sometimes convulsions—do not ordinarily occur early in the course of the disease in the States. The course of the disease in some of the Barrow dogs was peracute—death occurred within 24 hours of the onset of symptoms. In some instances, entire teams collapsed while out on trek and had to be destroyed.

Immunization Project

Immunization studies were started in August 1952 at Barrow, Anaktuvuk, and Wainwright to evaluate the possibility of controlling the disease by blanket or partial inoculation with attenuated canine distemper virus vaccine. All dogs available at Anaktuvuk (about 190) were inoculated to test blanket administration of attenuated virus vaccine.

At Barrow, some of the dogs brought to the immunization clinic were given vaccine and others were given a placebo. Selection was made by a random number system. Although response was poor—only 121 dogs were brought in—it may be possible to learn how vaccinated dogs and litters, with half the pups vaccinated, fare in an enzootic area.

By Karl R. Reinhard, D.V.M., veterinarian, Rocky Mountain Laboratory, Public Health Service, Hamilton, Mont.

The same random inoculation system was used on the 178 dogs brought to the clinic at Wainwright, a village possessing about 200 dogs. Two dogs had died the previous winter of a disease reported as similar to that in Barrow. Half the dogs were immunized to determine if this immunization level would induce pack immunity and protect the dogs of Wainwright against future extension of the disease from Barrow.

Mosquito Control



Mosquito control among Alaskan civilians is still rather primitive. It is almost wholly unorganized; is only slightly mechanized; and is improvident in that only small stores of materials and equipment are maintained. Civilian control is strikingly primitive in that the only measures used are those that give temporary relief. Little effort is made to prevent future attacks by destroying insects in vulnerable but nonbiting stages. Little is done on more than an individual or single family basis.

The military control program has achieved a high degree of organization and mechanization. Airplane spray is stored in strategic locations. Frequent estimates of the insect populations at widely separated bases are sent to the headquarters at Elmendorf Air Base. When the severity of the mosquito attack warrants, a spray team in a specially equipped C-47 is dispatched to do the necessary spraying.

The civilians, largely dependent on their bottles of repellent, lack organization and must pay for their projects. Even though the Territory is generally prosperous, the demand for capital is great. When the well is not yet dug and there are no windows in the house, insect control is apt to rate a low priority on the list of projects.

By Charles S. Wilson, M.S., entomologist, Arctic Health Research Center, Public Health Service, Anchorage.

Obstacles to Control

Many Alaskans would be willing to spend large amounts for mosquito control by stateside standards, but without organization they can do little.

For example, an aerosol spray unit for protecting single premises was an early product of the Arctic Health Research Center. In actual operation, this apparatus seems suitable for single family use. The problems of manufacture and supply have not yet been solved, however. Without the protection of a private patent, no manufacturer wants to produce the special nozzles required. Without an assured market, merchants are reluctant to stock the airplane type of spray solution required. If a market were available for only 50 units, the picture might change, but at present the device is used chiefly by the Air Force and by some nonprofit summer camps. Both groups are sufficiently organized to obtain insecticide before the mosquito season. The Air Force makes its own nozzles. The summer camps obtain them from the Arctic Health Research Center in return for cooperation in testing.

Around Fairbanks and Anchorage are civilian areas where many military personnel live off-post. These would benefit from an extension of the military spray operations. Although the organization of cooperative projects would seem to be advantageous, military regulations require: first, waiver of claims; next, right of entry to any private property sprayed by military planes; and third, contribution toward the cost according to the interest of the parties concerned.

Spraying property without legal authorization is trespass. Direct negotiation with each landholder for permission to spray may be possible in isolated areas, but it is practically impossible in the residential and suburban districts of Fairbanks and Anchorage. Some means must be found for obtaining blanket authorization and general assessment of the costs before spray programs can be developed for urban districts. Organization will certainly be called for if the advantages of airplane sprays are to be utilized.

The Alaska Department of Health has authority to spray private property when there is

threat of epidemic. Annually recurring mosquito seasons are not epidemics within the usual meaning of the term, although it may be argued that the itching sores resulting from insect attacks constitute diseases. However, the department has too many serious problems definitely falling within its province to be likely to seek authority for compulsory mosquito control.

Future Projects

The present program of insect control of the Arctic Health Research Center is largely devoted to development of methods and equipment for spraying with light airplanes such as those used by "bush" pilots. The chance of success seems fairly good, and if suitable methods and equipment for light planes are developed, the possibilities of acceptance and use appear to be very good. The greatest need, however, is for protection of the homesteader and isolated worker.

With bush pilots in the mosquito control business, the work will be mechanized, and the necessary stores of insecticide and equipment will be maintained by the pilot or his organization so that the word "improvident" will no longer apply. If costs can be made sufficiently low to permit wide use of airplane sprays, the necessary organizations will almost certainly develop. Then the advantages of mosquito larvicide may be utilized, attacks on the vulnerable larvae of black flies will become possible, and Alaskan insect control will have emerged from its primitive condition.

Mastoiditis



When large segments of a country's population are afflicted with a disease that interferes with education and ability to earn a livelihood, this disease becomes a public health problem.

In Alaska, mastoiditis is a public health problem. An incomplete survey of the population indicates that about 3,000 persons are afflicted with chronic mastoiditis of one or both ears.

Costs for surgical treatment of mastoiditis amount to about \$1,000 per patient, including

costs of transportation to a hospital, of hospitalization, of drugs, and of residence in a convalescent home until recovery. When hearing has been so badly impaired that even a hearing aid is not effective after surgery, persons must be sent to speech centers, at a further expenditure of money for transportation, subsistence, and tuition.

The great prevalence of mastoiditis in Alaska is due to many factors. It is estimated that 90 percent of the cases are among the Eskimos, Indians, and Aleuts. These people have become so inured to hardships that they tend to underestimate the importance of any ailment that is not immediately and obviously a threat to life. Other reasons for the prevalence in Alaska of this now "obsolete" disease are the distance of these people from adequate medical care; ignorance of the importance of the common cold, of tonsillitis, and otitis media and of how to recognize and treat these afflictions; and the lack of readily available hospital beds and of funds for carrying out simple, efficacious programs of prevention and treatment.

Proposed Prevention

Educational efforts must be directed to non-medical persons in the small villages who are interested in the health of their fellow citizens. They should be taught the value and proper use of simple nasal decongestants.

The nurses of the Alaska Department of Health and the Alaska Native Service should be taught the proper use of intranasal medications and of an agent applied topically in the external ear. They should also recognize the importance of removing tonsils and adenoids from children who have demonstrable hearing loss during head colds. The nurses should be required to report the names and other data on all patients who have a history of earaches or hearing loss with common colds, repeated attacks of otitis media, chronic otitis media, and chronic mastoiditis. For cases of chronic mastoiditis, which is recognizable by its continual

By Milo H. Fritz, M.D., Anchorage, consultant in ophthalmology and otolaryngology to the Alaska Department of Health.

discharge and extremely foul odor, the nurses should be taught the value and use of glycerite of hydrogen peroxide in keeping ear cavities clean and sweet and also that it does not cure the underlying pus-forming or suppurative process.

Itinerant physicians working for both government agencies and physicians in more or less fixed installations who have an orbit of activity in surrounding towns and villages should be taught how to administer a general anesthetic in the field and how to remove tonsils and adenoids.

Coordination With Universities

Another physician and I have gone to small villages from time to time and removed from 20 to 30 pairs of offending tonsils and adenoids in a period of 2 or 3 days. Two or three summers of this type of activity with university-sponsored physician-anesthetist teams and equipment would go far in reducing the continued development of cases of chronic mastoiditis.

Two universities (Duke University and University of Oregon) have participated so far in a program of sending members of their resident staff to Alaska for 6 months' training under supervision of the consultant certified by the American Boards of Ophthalmology and of Otolaryngology. It is hoped that other university medical schools may be encouraged to include such training as part of their formal residency programs.

Two Water Systems in Northern Canada



Water works engineers in Northern Canada and Alaska are faced with unique design and maintenance problems. Preventing the freezing of water and sewer lines is paramount to design and maintenance in northern climates, a factor which raises both construction and operating costs many times higher than those in more temperate regions. Avoiding the winter cold,

utilizing the sun's radiant heat in winter and summer, yet keeping excavation to a minimum and maintaining the lowest possible maintenance expenditures are some of the problems to be met. Temperature variations of different types of soil under various moisture conditions in disturbed and undisturbed ground and in various climatic regions need to be determined.

Two all-weather underground water supply systems installed within the last few years in the Northwest Territories of Canada have proved successful.

Yellowknife

One system is at Yellowknife, where the mean annual temperature is 22° F., and the top of the permafrost is 10 feet or less from the surface of the ground. Annual precipitation is 10 inches, and snowfall is sparse. Water is pumped from a bay, chlorinated, heated, and circulated through a grid system 3,500 feet from the pumphouse. Part of the water is returned to the pumphouse for reheating and recirculating.

Each main and house connection has a return line beside it. Water lines are of cast iron pipe, laid at 5 feet 6 inches minimum cover and to grade for drainage. Both 6-inch supply and 4-inch return mains, which are side by side, are insulated with approximately 1 foot of compacted moss on the top and sides and from 0 to 2 inches underneath. Extremely fine sand with granite outcroppings covers the area.

Meters and recording thermometers are located on discharge and return water lines in the pumphouse, and thermometer wells are located in the mains at the manholes. The water is heated from November through May. Originally installed in the pumphouse were two 60-hp. and one 80-hp. return tubular boilers, but one firebox and diffuser has been reduced to give roughly 15 hp. capacity. Under normal conditions, two ¾-inch copper lines are used

By Stanley S. Copp, M.S., sanitary engineer, Department of National Health and Welfare of Canada, Edmonton, Alberta.

for heating the water, one injecting into the recirculation line and one into the intake well. Outgoing water from the pumphouse is maintained at about 41° F. During March, when 80 percent of the outgoing water is recirculated, the temperature of the return water is about 40° F. On June 30, 1952, 1 month after heating was discontinued, the discharge temperature was 50° F., and temperature of the return water was 46° F.

Of the 37 fire hydrants, all of the dry barrel type, on the grid system, 8 froze last year. The most serious freezing occurs when circulation fails and the bottom of the hydrant freezes, but this happens infrequently. Caps and spindles at the top and at the drain opening at the bottom freeze often. Above-ground freeze-ups are thawed with blow torches; those below ground, by placing a fire pot in the manhole box overnight. Alcohol antifreeze is applied to caps, packing, and so forth, and hydrants are checked twice a week.

Five major breaks caused by frost action in the winter of 1952 were repaired without interruption of service. Excavation of breaks with jackhammers takes about 2 weeks per hole because of the hardness of the frozen ground. Bits are dulled and broken at about the same rate as in breaking concrete. Powder cannot be used because of the proximity of pipes, and holes cannot be backfilled until the frost is gone. Any interruption of service longer than one-half hour results in freeze-ups. None of the 142 service connections located at an average depth of 5 feet were frozen under normal operating conditions.

Fort Smith

About 175 miles farther south at Fort Smith is a system which preheats the water and utilizes bleeders at dead ends. The settlement has a mean annual temperature of 25° F. The soil is a fine sand.

Two intakes drilled horizontally through 40 feet of solid rock into rapids on the Slave River supply water to pumps on the edge of the river. From there, the water is pumped to a treatment plant on the top of the bank. Alum and soda ash are added, and the water is spirally mixed upward, settled, filtered, chlorinated, and stored in a reservoir under the plant. The

treated water is then heated and pumped through a pressure tank to the distribution system.

Transit pipe is used for the distribution system, which is laid at an average depth of 10 feet and a minimum depth of 8 feet. Minimum depth for house connections was specified for 8 feet, but some are laid at only 6 feet and are frozen several times during the cold weather.

The temperature of the river water varies from 32.8° to 65° F. In January, water leaving the plant at 42° F. is cooled to 35° F. at the end of the system. On April 7, 1952, the 4-inch main at the end of the system froze, disrupting two services. The frost penetrated 14 feet at this point. The two intakes from the river froze, and a gasoline pump had to be used to pump water over the ice to the wet well. Several house connections were frozen for a short period, two for more than a day.

Conclusion

Permafrost, which reaches nearly to the surface at Yellowknife, is not the insurmountable obstacle it was once considered to be. It is hoped that these two experiences may lead to less costly systems which permit other supplies to be installed and operating expenditures lowered. Installation costs may be lowered by consolidation of settlements so that lengths of water lines may be kept to a minimum and expenditures shared. With the installation of more water supply systems, the northern areas may become more developed and modernized, and waterborne epidemics may be reduced or eliminated.

Water Pollution Studies



Comprehensive physical, chemical, and biological investigations of the waters of Alaska were initiated by the Alaska Water Pollution Control Board in the summer of 1951. New industry

By Amos J. Alter, C.E., M.P.H., administrator, and William L. Porter, M.P.H., chief of field investigations, Alaska Water Pollution Control Board, Juneau.

and an increasing population in Alaska, as well as a territorial-wide awakening to the health and economic threat of polluted streams, coastal waters, and lakes, have prompted Alaska to plan for the orderly use of her waters. Alaska is in a strategic position for practicing preventive water pollution control rather than the more expensive corrective control.

Ward Cove Study

In order to develop the water resources of Alaska, careful and complete investigation of water assets and liabilities and logical matching of type and extent of water use must be undertaken. The first attempt to evaluate water assets and liabilities is being made at Ward Cove, located on Tongass Narrows about 5 miles northwest of Ketchikan. The Ketchikan Pump Company is constructing a pulp mill at this location. The cove is 1 mile in length and at mean lower low water tide it contains about 25,500 acre-feet of water. It is surrounded by heavily forested mountain slopes. Rainfall averages about 150 inches annually. Discharging at the head of the cove is Ward Creek, a swiftly moving stream dropping quickly from the mountain slopes to the cove.

Observation of the following characteristics of water in the cove was begun October 1, 1951, for completion on September 30, 1952: types and numbers of marine plants and animals; water temperature, turbidity, and color; tidal movement and exchange; fresh water discharge into the cove; type, strength, and general characteristics of wastes entering the cove; dissolved oxygen concentration, percentage of oxygen saturation, and 5-day biochemical oxygen demand; most probable numbers of coliform bacteria; total solids, dissolved solids, ignited dissolved solids; and pH, chlorides, sulfates, iron, magnesium, and calcium.

Preliminary Report

Almost 4,000 physical, chemical, and biological examinations were completed by August 7, 1952. Calculations based on the data collected will reveal the degree of waste treatment and/or dilution necessary for orderly use of the waters of the cove and will provide a background of basic data necessary for later evaluations. A preliminary review of the observations presents interesting trends.

Chemical. Dissolved oxygen concentrations during the winter and spring were generally 80 percent of saturation or over. During the summer months the upper water strata were supersaturated during the day as a result of biochemical photosynthesis. There was a decrease of dissolved oxygen in the lower depths during the fall to the extent of a noticeable oxygen sag.

Chlorides, sulfates, alkalinity, and calcium varied inversely as the water temperature; pH varied directly as the water temperature. No trend is yet apparent for solids, magnesium, and iron in analyses of samples from October 1951 to January 1952.

Biochemical Oxygen Demand. The biochemical oxygen demand (B.O.D.) was generally below 0.5 ppm except during July and August. At that time it increased to over 1 ppm.

Physical. Temperatures of surface waters ranged from 4° C. in March to 16° C. in August, and from 5° C. in March to 10° C. in August at the 100-foot depth. Turbidities ranged from 0.32 to 3.2 ppm. Color was generally less than 5 ppm.

Biological. There is abundant marine life on the shore, on the bottom, and in the waters of the cove.

Hydrological. The fresh water current from Ward Creek has little effect on the cove waters except during or near flood run-offs, and then it is limited to the top few feet of surface water near the creek mouth and to an area of from 100 to 200 feet in width through the center of the cove.

Nearly all the movement of the tidal waters to and from the cove is surface movement above mean lower low water. This condition of little or no current at lower depths extends into Tongass Narrows.

Approximately 95 percent of the dissolved oxygen replaced by diffusion to the cove waters takes place above 15 feet below lower low water. The two important sources of reoxygenation of cove waters are the tidal exchange and diffusion above mean lower low water. Any large biochemical oxygen demands at the lower depths would probably result in a septic condition because at these depths oxygen would be replaced slowly. The most critical period with regard to maintaining an adequate dissolved oxygen

concentration was during the period of highest water temperatures, from July 31 to August 7, 1952.

Anchorage Food Study



Alaska is almost completely dependent on long supply lines from the west coast of the United States. Their possible disruption in times of emergency must be considered in civil defense planning.

To obtain estimates of actual food consumption and to compare Alaskan food habits with those of the continental United States, Anchorage and its vicinity were surveyed in 1950 and 1951. Because of the large numbers of military dependents and transient workers in the area, no reliable estimates of the civilian population were available to serve as a population base for the survey.

Food Consumption

Anchorage residents eat well. But Alaskan food habits differ in several ways from those in the States. Food costs are high in Alaska, but wages and salaries are high also and may compensate for the price increases. The higher costs may be disproportionate for some types of food. Perishable foods, and some items not ordinarily considered perishable, may be of poor quality. Finally, the population has an unusually large proportion of young people.

Of milk products other than fresh milk, two-thirds of Anchorage consumption is canned milk, almost five times the average consumption in the States. While consumption of milk and milk products in Alaska is 65 percent of that in the States on a retail weight basis, consumption on a whole milk equivalent basis is 84 percent of that in the States.

Egg consumption is only slightly less. The price of eggs increases in the following order: boat, airborne, local.

By Edward M. Scott, Ph.D., biochemist, and Edward S. Weiss, M.P.H., statistician, Arctic Health Research Center, Public Health Service, Anchorage.

Frozen meat, poultry, and fish are shipped by boat. Meat and fish supplied from local sources are about two-thirds wild game and fish, with moose, caribou, and salmon predominating. Meat consumption is unexpectedly high, possibly because meat prices on a percentage basis may not be as high as those of other foods when compared with prices in the States. The high meat consumption compensates to a considerable extent for the low intake of milk.

The consumption of butter and margarine is almost identical with that in the States. However, only one-fourth as much bacon, salt pork, and lard is eaten in Anchorage, probably because of the instability of these products. Use of shortening other than lard is somewhat greater in Anchorage.

The consumption of potatoes in Alaska is understandably high, since prices of this vegetable, particularly the local product, are quite reasonable. Citrus fruit and tomato consumption is low. Consumption of other fruits and vegetables is almost equal to that in the States. Less grain products are eaten in Anchorage, but more sugar compensates for this.

Civilian food consumption was determined by a census of food imported by rail, by truck, and by airplane, and by an estimate of local production in 1950. Direct air shipments, which consisted of meat, produce, and eggs, were actually enumerated for one airline and estimated for another. Truck shipments supplied only a few grocers, and the amount shipped was estimated from the gross sales of these retailers. Distribution of truck shipments into food classes was assumed to be the same as that of rail shipments since both were shipped by boat to Alaska.

The amount of food shipped by rail was estimated by sampling the records of the Alaska Railroad. To determine food classes, 24 of the 126 ships with food consigned to Anchorage in 1950 were selected as a sample with regard to season and type of ship. Every food item, in all more than 5,000, on the ships' manifests was recorded and tabulated to furnish the sample from which the total rail shipments were estimated.

The Alaska Agricultural Experiment Station estimated local agricultural production, and the

Fish and Wildlife Service estimated wild game and fish consumption.

Food Supplies

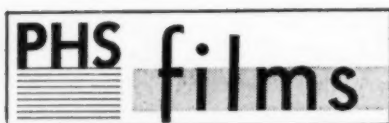
The amount of food stored in Anchorage was also determined to provide an estimate of the average period of storage before consumption and of the length of time food stores would last if supplies were cut off.

Dollar value inventories of all retailers' stocks were compiled as of January 1, 1951. A representative sample of retail inventories was selected. The items in each sample inventory were actually enumerated to provide a basis for calculating total food class inventories from total dollar value inventories. Supplies of wholesalers and miscellaneous food handlers

were also enumerated. Those of restaurants were estimated from a sample of dollar value inventories.

The average storage life of imported foods was found to be 36 days for all food classes. For fresh and frozen meat, poultry, and fish it is 21 days; grain products, 76 days; dairy products excluding butter, 34; canned citrus fruit and tomatoes, 55; and other canned fruits and vegetables, 82.

These results indicate that in the event of complete stoppage of normal supplies to Alaska, there would probably be enough staple foods to last until some emergency method of supplying food could be set up. However, many perishable items would become unavailable almost immediately, necessitating some substitutions.



Laboratory Diagnosis of Trichophyton Infections

PART I. Ectothrix Infections of the Beard and Scalp Caused by *Trichophyton mentagrophytes* and *Trichophyton faviforme*.

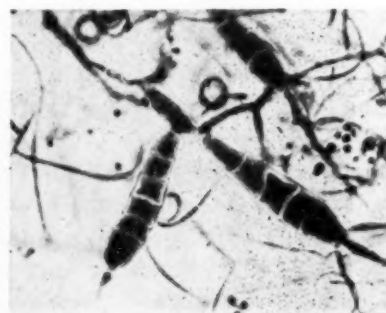
PART II. Endothrix Infections of the Scalp Caused by *Trichophyton tonsurans* and *Trichophyton violaceum*.

35 mm., sound, color, Part I—13 minutes; Part II—10 minutes, 1952.

Audience: Laboratory technicians (bacteriologists and mycologists), State and local health department laboratory directors, medical and veterinary students, dermatologists, and physicians and nurses interested in this problem.

Available: Loan—Public Health Service, Communicable Disease Center, 50 7th St., NE., Atlanta 5, Ga. Purchase—United World Films, Inc., 1445 Park Ave. New York 29, N. Y.

These films are designed to aid in teaching the procedure for identifying the etiological agent responsible for certain types of ringworm infections involving the hairs of the scalp and bearded areas. The preliminary procedures and final observations by which the medical technician (bacteriologist or mycologist) or dermatologist may isolate and identify the



Microscopic mount for *Trichophyton mentagrophytes*.

responsible fungi are depicted.

The films show the possible sources of *Trichophyton* infections, the method of examining the patient and of obtaining and examining the clinical material. They show the cultural methods used for isolation and the techniques for identifying the fungus agent when it is isolated. Part I is concerned with ectothrix infections, and part II with endothrix infections.



Characteristic suppurative lesions caused by ectothrix *Trichophyton*.

The Composition of the Sanitary Engineering Profession

The sanitary engineer is largely a North American phenomenon, the result of efforts to protect health and prolong life through an attack on the environmental influences which cause disease.

In order to determine the nature of the sanitary engineer—who he is, where he works, what his activities are, his age, professional and educational background—an analysis was made by the Division of Engineering Resources, Public Health Service, based upon data loaned to the division by the American Public Health Association. The data were originally collected by the American Public Health Association for the purpose of establishing the Roster of Public Health and Sanitary Engineers.

The survey was conducted from the spring of 1949 to October 1950 by a self-coding questionnaire. A total of 10,757 questionnaires were sent to persons whose names were obtained from the membership lists of various engineering associations and professional engineering registration lists. There were 6,368 respondents of whom 4,933 felt that they met the definition of a sanitary engineer as set forth by the National Research Council. Following careful editing with respect to educational and professional qualifications, 4,116 remained as the base group for the study.

On the basis of the survey it is estimated that there were, in 1950, 5,000 sanitary engineers in the country—33.2 per million population. Of those who participated in the survey, two-thirds devoted more than three-fourths of their time to sanitary engineering activities (discussed as group I); about 19 percent between 50 and 75 percent of their time (group II); and 19 per-

cent less than 50 percent of their time (group III).

A relatively small proportion (35 percent) of sanitary engineers has a formal sanitary engineering education. There is a considerable rise in the educational level, as is seen in the shift toward more sanitary engineers in the "master's" and fewer in the "no degree" levels in the younger age groups. Sanitary engineers in group I are better educated than those in group II and III. In group I, 28 percent have reached the master's level; for groups II and III the percents are 13 and 11, respectively.

The civil engineering curriculum has provided the basis for the undergraduate education of most of the members of the profession. In regard to experience, broadly speaking, almost half of all sanitary engineers have obtained a significant part of their professional experience outside the field.

The various branches of the engineering profession have between 1.6 and 18.3 percent of their members engaged in research activities. Therefore sanitary engineering, with only 1.9 percent of its personnel doing research, ranks low in this respect.

The four leading types of activity are public health, designing, consulting, and municipal. About 80 percent of all sanitary engineers are in some way connected with water and sewage programs.

The data on the characteristics of the sanitary engineering profession are given in the form of tables, charts, and other graphic devices. Age, numbers, education, types of degrees, activities, and professional area are covered by these statistics which are presented in individual tables or correlated in various combinations.

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Lyon, Walter A., and Miller, Arthur P.: *The Composition of the Sanitary Engineering Profession*. (Scientific Manpower Series No. 2, Office of Education, Federal Security Agency) 1952. 36 pages; tables; charts. 15 cents. A limited number of copies are available

upon request to the Division of Engineering Resources, Public Health Service, Washington 25, D. C.

Cancer Morbidity Series

Cancer illness among the residents of Birmingham, Ala., and Detroit, Mich., is covered in publications 8 and 9 in the Cancer Morbidity Series. Both cities showed an increase in cancer incidence in the past 10 years, according to the reports.

In the Birmingham area the incidence rate during 1948 was 71 percent greater than in 1938 and the mortality rate was 24 percent greater. The incidence increase in Detroit in the 10-year period was 59 percent. These increases in incidence may have been due in part to better reporting by physicians, improvements in diagnostic and case-finding methods, and aging of the population.

The Birmingham survey showed that of all the cancer cases diagnosed when the disease was localized, 87 percent survived 12 months. In cases not discovered until regional involvement had taken place, 66 percent survived 12 months, and in cases not diagnosed until remote metastasis had occurred, only 33 percent survived a year.

Similarly, in Detroit, 78 percent of cases of early diagnosed cancer, 54 percent of those discovered after regional involvement, and only 22 percent of cases diagnosed after remote metastasis survived 1 year.

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Cancer Illness Among Residents of Birmingham, Ala. Cancer Morbidity Series No. 8. (Public Health Service Publication No. 216) 1952. 49 pages; tables, charts.

Cancer Illness Among Residents of Detroit, Mich. Cancer Morbidity Series No. 9. (Public Health Service Publication No. 217) 1952. 48 pages; tables, charts.

Single copies of these publications may be obtained from the National Cancer Institute, Public Health Service, Bethesda, 14, Md.

Office of Defense Mobilization Pamphlets

Maintaining the worker's health and the employability of women, the elderly, and the disabled are subjects covered in four Office of Defense Mobilization pamphlets.

"The Worker and His Health" estimates sickness absenteeism in industry to be 400-500 million man-days a year, an equivalent of almost 2 million men absent from their jobs for a year. More than 90 percent of the illnesses have nonoccupational causes. Experience in plants, the pamphlet states, has shown that in-plant health services can reduce losses from sickness absenteeism by one-third to one-half. The value of in-plant health programs is stressed, and steps for their development are suggested. Local health departments, medical and dental societies, visiting nurse associations, employer associations, labor organizations, and other firms with in-plant health services are referred to as the best sources from which to obtain information on how to initiate an in-plant health program.

Women, and handicapped and older workers have production and safety records as good as or better than other workers, the pamphlets, "A Job for Women," "The Disabled Can Work," and "Production at Any Age," claim. Increasing numbers of women are finding employment in industry. The Bureau of the Census estimates that 19 million women, or 30 percent of all workers, are in the civilian labor force today.

"A Job for Women" outlines the importance of matching the woman worker's physical, mental, and emotional capacity, against the demands of the job to assure successful placement.

"The Disabled Can Work" states that through rehabilitation many physical and mental handicaps can be eliminated or reduced to enable

workers with disabilities to meet demands of selected jobs. When the disability is properly treated, the person trained for and placed in the right job can meet the requirements as well as anyone. Advances in medical knowledge, improvements in prosthetic devices, development of specialized rehabilitation centers, and the establishment of vocational rehabilitation and placement programs have made it possible for thousands of disabled men and women to resume active lives and enter the labor force as self-supporting citizens. The plant medical department plays an important part in aiding the placement of the handicapped worker.

"Production at Any Age" cites the older person's need of productive activity with pay checks. Industry, the community, and the Nation have a stake in the usefulness and economic productivity of older workers, the pamphlet states in emphasizing the necessity of breaking down current prejudices against hiring this group. Industry can help provide much needed information for proper placement of older workers through careful study of job requirements, conditions of entry, and the productivity of older workers. In-plant health services can also contribute much to the health and productivity of the older worker, through periodic physical examinations and other preventive services. Similarly, benefits would accrue to all the workers from the preventive services of such in-plant health plans.

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The Worker and His Health. (Office of Defense Mobilization, Health Resources Advisory Committee) Washington 25, D. C., 1952. 8 pages; illustrated; references.

A Job for Women. (Office of Defense Mobilization, Health Resources Advisory Committee) Washington 25, D. C., 1952. 8 pages; illustrated; references.

The Disabled Can Work. (Office of Defense Mobilization, Health Resources Advisory Committee) Washington 25, D. C., 1952. 7 pages; illustrated; references.

Production at Any Age. (Office of Defense Mobilization, Health Resources Advisory Committee) Washington 25, D. C. 7 pages; illustrated; references.

Copies of these publications are available upon request to the Division of Occupational Health, Public Health Service, Washington 25, D. C.

Clean Water Pamphlets

"Till taught by pain men really know not what good water's worth." This quotation from Lord Byron prefaces each of four pamphlets which deal in a personalized way with the pollution problem in its respective river basin area.

Based upon the longer technical reports of the cooperative State-Federal drainage basin surveys, the pamphlets present the story of pollution in terms of the interests of the people in each area. They describe the cities which are situated along the rivers, their industries, and what each is contributing to the pollution problem in terms of dangers to health, agriculture, recreation. The pamphlets tell what the cities are doing about the pollution problems—which are and which are not treating their sewage. And finally they tell what the people must do to correct the problem.

These four pamphlets are part of a group of 15 that are being prepared in connection with the longer drainage basin surveys.

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Clean Water for the Pacific Northwest. (Public Health Service Publication No. 201) 1952. 6 pages; illustrated. 5 cents.

From the Hudson to the Potomac: Clean Waters. (Public Health Service Publication No. 202) 1952. 6 pages; illustrated. 5 cents.

Cleaner Water for the Ohio. (Public Health Service Publication No. 203) 1952. 6 pages; illustrated. 5 cents.

Clean Water for New England. (Public Health Service Publication No. 199) 1952. 6 pages; illustrated. 5 cents.

Keeping Our Hospitals Operating— A Study of Supply and Equipment Requirements

Results have now been published of the study undertaken by the American Hospital Association and the Public Health Service to determine the maintenance, repair, and operating (MRO) requirements for civilian hospital equipment and supplies.

The operating workload of the survey was carried principally by the Divisions of Civilian Health Requirements and Hospital Facilities of the Public Health Service. Survey questionnaires were mailed to all continental United States non-Federal hospitals of 15-bed size or larger that were on the American Hospital Association's mailing list, including nonmembers. Presented in the report are the estimated requirements for 585 hospital items, based on replies from over 2,600 hospitals of every type and size throughout the country. The number of hospitals which returned replies represents about 55 percent of the hospitals queried. Long-life items are reported in terms of national 5-year requirements; short-life items in terms of national 1-year requirements. A detailed breakdown of the survey data is included for further use by researchers in this field. The survey is the most comprehensive ever undertaken to determine what equipment and supplies are required by hospitals.

During a period of mobilization, accurate knowledge of essential civilian needs is necessary for making proper decisions and allocations respecting any segment of our economy, the report notes. Hospital specialists, who had personal experience with allocations during World War II, favored the study, because of the handicaps that they previously had encountered.

In summarizing the survey, the introductory section of the report cites the uses of the estimates as follows:

1. By agencies of the Government—in preparing and analyzing

proportionate civilian and military hospital requirements in this field.

2. By distribution agencies—as a factor in distributing critical materials.

3. By hospital administrators—in conducting intensive studies of institutional operation.

4. By the manufacturing industry—as a factor in considering adequacy of productive capacity.

5. By the combined manufacturing and distributive industries—in designing distribution operations.

The MRO study of hospital equipment and supplies is a part of the overall surveillance of supply-and-demand relationships with respect to health material that is being conducted by the Public Health Service.

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Keeping Our Hospitals Operating.
A study of supply and equipment requirements. (Public Health Service Publication No. 272) 1953. 191 pages; tables. 45 cents.

Community-Wide Installation of Household Garbage-Grinders

This is a joint publication of the Indiana State Board of Health and the Public Health Service prepared in answer to many requests from city governments, sanitary engineers, and the plumbing industry for information on the results of the Jasper, Ind., experiment. In December 1949, Jasper became the first municipality to undertake the elimination of garbage collection through the installation of home garbage-grinders. The project was begun after an epidemic of hog cholera resulted in the refusal of contractors to collect Jasper's garbage. In the 18-month period of this study 900 household garbage-grinders were installed, servicing 75 percent of the population.

The report is preliminary, since the restaurants and food service establishments have not as yet installed garbage-grinders. In addition to background information on the development of the project it discusses the effect on the sewerage system, water consumption, refuse

collection and disposal, fly densities and rodent infestation.

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Erganian, George K., Belter, Walter G., Graber, Ralph, C.: *Community-Wide Installation of Household Garbage-Grinders.* (Public Health Service Publication No. 224) 1952. 41 pages; illustrations, tables, charts. 20 cents.

The Sanitary Landfill in Northern States

In 1948 the North Dakota State Department of Health invited the Public Health Service to participate in a study of the use of landfill techniques to provide a sanitary solution to the refuse disposal problem in cold climates. The city of Mandan, North Dakota, was selected for the study, which began in 1949.

A report of the Mandan project appeared in the March 1952 issue of *Public Health Reports*. This publication presents a more detailed and technical discussion of the experiment including the selection of the first and second sites, plans of operation, and details of construction of the landfill. An outline for a small community operation is given with information on temperature studies, physical and chemical analyses, and a tabulation of operational costs for a 1-year period.

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Weaver, Leo, and Keagy, Donald M.: *The Sanitary Landfill in Northern States.* (Public Health Service Publication No. 226) 1952. 31 pages; illustrated, tables, charts. 20 cents.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication (including its Public Health Service publication number). Single copies of most Public Health Service publications can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.



Community-wide X-ray Surveys, 1945-1953,

Large cities in the United States have the highest tuberculosis death rates, but because of their very size they present unusual difficulties to health department case-finding activities. To help metropolitan areas carry out chest X-ray surveys quickly and effectively, the Pub-

lic Health Service, on request, provides X-ray machines and technicians. Public Health Service physicians read the films, and consultation is given by Service physicians, nurses, medical social workers, health educators, and records specialists.



3, conducted with Public Health Service Assistance

Since October 1945, the health officers of 31 areas have requested and received this service. These areas, 24 defined by the Bureau of the Census as "metropolitan" (over 100,000 population) and 7 other densely populated places, are indicated on the accompanying map by solid

symbols. Also shown on the map are the size and the proportionate tuberculosis mortality of the other metropolitan areas over 100,000 population. The table on the following page summarizes key findings.

Thirty-one community-wide X-ray surveys, 1945-53

Location of survey	Total screening films taken by team	Index of coverage ¹	Screening film readings				
			Total satisfactory films	Suspected abnormal findings			
				Total	Tuberculosis	Other chest disease	Cardiovascular disease
Savannah, Ga.....	74, 311	65. 5	67, 961	1, 220	755	465	(²)
Columbus, Ga.....	53, 144	74. 6	52, 093	2, 618	1, 422	1, 196	(²)
Gaston, Wayne and Cleveland Counties, N. C.....	113, 422	83. 1	110, 236	1, 980	1, 222	758	(²)
Milwaukee, Wis.....	181, 263	38. 2	176, 469	4, 333	2, 805	971	577
Minneapolis, Minn.....	306, 020	75. 2	301, 513	10, 238	5, 977	3, 403	858
Oak Ridge, Tenn.....	13, 537	38. 4	13, 421	992	536	456	(²)
St. Paul, Minn.....	129, 401	55. 4	125, 853	4, 417	2, 197	1, 161	1, 059
Washington, D. C.....	454, 130	64. 2	439, 927	21, 858	12, 464	4, 862	4, 532
Seattle metropolitan area, Wash.....	375, 933	65. 9	367, 732	14, 331	8, 372	3, 495	2, 464
Tacoma metropolitan area, Wash.....	73, 197	67. 5	72, 703	1, 462	951	383	128
Cleveland metropolitan area, Ohio.....	684, 763	64. 4	673, 115	15, 998	8, 125	3, 447	4, 426
Spokane metropolitan area, Wash.....	106, 962	89. 2	106, 526	2, 813	1, 591	749	473
Denver metropolitan area, Colo.....	326, 326	80. 1	324, 096	10, 646	7, 312	1, 826	1, 508
Boston, Mass.....	536, 012	86. 3	528, 941	14, 442	8, 060	3, 067	3, 315
Salt Lake City metropolitan area, Utah.....	162, 854	93. 1	162, 351	4, 124	1, 544	1, 204	1, 376
San Diego metropolitan area, Calif.....	239, 585	81. 9	238, 557	8, 547	4, 643	2, 359	1, 545
Los Angeles and Los Angeles County, Calif.....	1, 755, 001	55. 6	1,736,703	67, 966	44, 328	13, 125	10, 513
Contra Costa County (Richmond), Calif.....	124, 118	57. 8	121, 434	5, 168	2, 968	1, 436	764
Phoenix metropolitan area, Ariz.....	176, 964	76. 2	175, 724	12, 724	9, 851	1, 650	1, 223
Albuquerque metropolitan area, N. Mex.....	77, 329	75. 9	77, 082	3, 849	2, 754	727	368
Willamette Valley, Oreg.....	237, 229	64. 0	234, 809	7, 415	4, 222	2, 846	347
Vancouver and 4 counties, Wash.....	75, 073	72. 6	74, 415	3, 092	1, 522	1, 282	288
Southern Oregon.....	66, 630	66. 7	66, 147	2, 556	1, 305	1, 001	250
Portland and Multnomah County, Oreg.....	237, 970	64. 4	234, 723	10, 439	4, 914	3, 819	1, 706
Dallas metropolitan area, Tex.....	271, 852	62. 5	269, 845	9, 260	5, 127	3, 004	1, 129
Worcester and 10 towns, Mass.....	153, 510	82. 3	152, 260	5, 263	2, 599	2, 262	402
Fall River, Mass.....	31, 548	37. 3	31, 327	1, 154	563	427	164
Lake Charles and 2 parishes, La.....	54, 305	81. 1	54, 130	1, 277	734	359	184
Fresno metropolitan area, Calif.....	165, 730	85. 2	(³)				
Charlotte metropolitan area, N. C.....	106, 821	75. 4	(³)				
Pittsburgh and Allegheny County, Pa.....	(³)						
Total.....	47, 364, 940	64. 9	6,990,093	250, 182	148, 863	61, 740	39, 579
Percentages.....			100. 0	3. 6	2. 1	0. 9	0. 6

¹ X-rays taken as percentage of population 15 years of age and over. ² Suspected cardiovascular findings are included in suspected other chest disease findings. The totals for each of these columns are therefore over- and under-stated, respectively. ³ Final report not yet received, survey in operation at time of publication. ⁴ In addition, over 500,000 X-rays were taken during this period in limited resurveys in Washington, D. C., and Cleveland, Ohio; in case finding surveys among migrant workers; and in other areas to which only photofluorographic equipment and technicians were supplied.

This report was prepared by the Division of Chronic Disease and Tuberculosis, Public Health Service.